THE BEHAVIOUR OF FINANCIAL RATIOS FOR CAPITAL INTENSIVE AND LABOUR INTENSIVE ENTERPRISES DURING AN UPSWING AND DECLINE PHASE OF THE ECONOMIC CYCLE

By

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DECLARATION

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

ABSTRACT

Financial performance ratios are generally based on a set of financial statements without taking cognisance of other factors that could affect the measurement of performance. The behaviour of financial performance indicators during an upswing and decline phase of the economic cycle, together with the nature and scope of an enterprise's activities may have an effect on the manner in which financial performance indicators are used by an enterprise. The question may arise whether or not a ratio's behaviour for capital intensive (CI) and labour intensive (LI) enterprises could capture the essence of external factors such as an upswing or decline in the economic cycle as measured by the Gross Domestic Product (GDP).

In this study an upswing phase (1987-1989) of three years and a decline phase (1990-1992) of three years have been selected after an analysis of the economic cycle over the period 1970 to 1996. The distinction between the capital and labour intensity of an enterprise is based on an analysis of the total assets, fixed assets and number of employees of industrial enterprises listed on the Johannesburg Stock Exchange (JSE). The initially selected 62 financial performance indicators categorised under profitability, growth, cash flow, value-added and inflation-adjusted ratios are calculated for each enterprise of the CI (33) and LI (36) groups and for each year of the research period.

The primary objectives of the research are:

- To distinguish between the CI and LI nature of enterprises listed in the industrial sector of the JSE by using measures of capital and labour intensity;

- To obtain patterns and identify differences in the behaviour of the selected financial indicators between CI and LI enterprises during an upswing and decline phase of the economic cycle, as measured by the GDP;

- To analyse and investigate patterns and differences to determine whether or not there is specific justification(s) for the behaviour exhibited by the CI and LI enterprises for a particular ratio during either or both the upswing and decline phases of the economic cycle;

- To identify key financial indicators, which could possibly be used by CI and LI enterprises to forecast financial performance and to identify lead and lag patterns in the economic cycle.

An elaborate statistical analysis is conducted of the ratios to satisfy the objectives stipulated above. The first part of the analysis is based on a single representative measure, which represents an average of the three-year upswing and three-year decline phases respectively. Mean and median values are calculated for the CI and LI enterprises for both the upswing and decline phases. A profile analysis based on Hotelling's T^2 test is used for the analysis of ratios that exhibit approximate normal distributions. Non-parametric tests, Mann-Whitney U-test and Wilcoxon matched-pairs test, are used for the analysis of ratios that do not indicate approximately normal distributions.

The second part of the study focuses on an analysis of the ratios based on the individual years of the research period. The statistical techniques used for the analysis of the ratios based on a single representative measure are also used in the analysis of the ratios based on the individual years. The limitations identified during the analysis based on a single representative measure are addressed to a large extent in this section of the statistical analysis. By analysing the mean and median values based on the individual years, it is possible to classify the ratios as one of five pattern groups exhibited by the CI and LI enterprises, i.e. normal expected, lag, lead, cyclical and mixed. The patterns of the various ratios within each of the pattern groups are also analysed from a financial management perspective.

The findings of the study confirm the stated hypothesis that there are differences in the behaviour of financial indicators based on a single representative measure and over the individual years of the research period between CI and LI enterprises during either or both an upswing and decline phase of the economic cycle.

Furthermore, the analysis highlights several ratios based on a single representative measure that could not be used universally by all enterprises to measure financial performance and only during either an upswing or decline phase of the economic cycle. Ratios which are part of this category include return on total net assets (before tax), return on total net operating assets, dividend per share, sales to total net assets and interest-bearing debt to total shareholders' interest.

The results based on the individual years of the analysis indicate that a large number of ratios exhibit normal expected patterns. Among the traditional profitability indicators, 80% exhibit normal expected patterns for the CI and LI enterprises during the upswing and decline phases. Traditional profitability ratios such as return on total net assets, return on net operating assets, return on total shareholders' interest and the value-creation ratio, economic value added form part of the normal expected group of patterns. All the inflation-adjusted ratios indicate normal expected patterns. These ratios indicate relative stability over the economic cycle and may be appropriate for the purposes of medium- and long-term financial forecasting as they follow the trade cycle. Approximately 39% of the ratios indicate mixed patterns, i.e. different patterns for the CI and LI enterprises. The growth in attributable earnings, cash flow to interest payments, market value of equity to book value of equity and market value added ratios indicate behaviour patterns for the CI and LI enterprises which may lead the economic cycle. These ratios may indicate the possibility of anticipating upswing and decline phases in the economic cycle.

The relevance of the results for a CI enterprise alludes to the use of more debt financing during the decline phase to cover costs and working capital requirements when demand for products and services decreases as a result of a slow-down in the economy. The pattern exhibited by EPS may allude to an anticipated upswing phase in the economic cycle. An increase in the cash flow to interest payments ratio during the decline phase may indicate an imminent change in the cycle of the economy.

The relevance of the results for LI enterprises indicates that an upswing in the economic cycle may be anticipated by an increase in the working capital to operating cash flow ratio. More debt financing is used during the upswing period, which may be attributed to greater demand and consequently results in a higher gearing position for LI enterprises. An increase in the cash flow to interest payments ratio during the decline phase may indicate an imminent upswing in the economic cycle.

Several limitations of the study include the use of a single upswing and decline phase to represent the movements of the economic cycle; the approach used to distinguish between the CI and LI enterprises requires further analysis, and the large number of ratios could in future research be limited to several indicators.

The more important recommendations of the study include the use of multiple upswing and decline phases of the economic cycle; more research into the lags and leads exhibited by the CI and LI enterprises for specific ratios should be conducted; the possibility of adopting a different approach to distinguish between CI and LI enterprises could also be considered; and further research is required to ascertain the reliability of indicators that highlight lead patterns for forecasting an upswing or decline phase in the economic cycle.

SAMEVATTING

Finansiële verhoudingsgetalle word algemeen op 'n stel finansiële state gebaseer sonder dat ander faktore wat die meting van prestasie kan beïnvloed, in ag geneem word. Die gedrag van finansiële verhoudingsgetalle tydens 'n opswaai en afswaai-fase van die ekonomiese siklus, tesame met die aard en omvang van 'n onderneming se aktiwiteite, mag die manier waarop 'n onderneming finansiële verhoudingsgetalle gebruik, beïnvloed. Die vraag mag ontstaan of 'n verhoudingsgetal se gedrag vir kapitaalintensiewe (KI) en arbeidsintensiewe (AI) ondernemings die essensie van eksterne faktore soos 'n opswaai en afswaai in die ekonomiese siklus soos gemeet deur die Bruto Binnelandse Produk (BBP), sal kan omvat.

In hierdie studie is 'n opswaai-fase van drie jaar (1987-1989) en 'n afswaai-fase van drie jaar (1990-1992) geselekteer ná 'n analise van die ekonomiese siklus vir die periode 1970-1996. Die onderskeid tussen die kapitaal- en arbeidsintensiteit van 'n onderneming is op 'n analise van totale bates, vaste bates en die aantal werknemers van nywerheidsondernemings wat op die Johannesburg Aandelebeurs (JAB) genoteer is, gebaseer. Die 62 gekose finansiële verhoudingsgetalle wat as winsgewindheid-, groei-, kontantvloei-, toegevoegdewaarde- en inflasie-aangepaste verhoudingsgetalle gegroepeer is, is vir elkeen van die 33 KI ondernemings en die 36 AI ondernemings, sowel as vir elke jaar van die ondersoekperiode, bereken.

Die primêre doelstellings van die navorsing is:

- Om tussen die KI en AI aard van ondernemings wat in die industriële sektor van die JAB genoteer is, te onderskei deur maatstawe van kapitaal- en arbeidsintensiwiteit te gebruik.

- Om patrone te verkry en verskille in die gedrag van die gekose verhoudingsgetalle gedurende opswaai- en afswaai-fases van die ekonomiese siklus soos gemeet deur die BBP, tussen KI en AI ondernemings te identifiseer.

- Om patrone en verskille te ontleed en ondersoek ten einde te bepaal of daar spesifieke regverdiging is vir die gedrag wat deur KI en AI ondernemings vir 'n bepaalde verhoudingsgetal gedurende een of albei van die opswaai- en afswaai-fases van die ekonomiese siklus getoon word.

- Om bepaalde finansiële verhoudingsgetalle vir KI en AI ondernemings te identifiseer wat moontlik gebruik kan word om finansiële prestasie te voorspel en om lei- en sloerpatrone in die ekonomiese siklus te identifiseer.

'n Omvattende statistiese analise van die verhoudingsgetalle is uitgevoer om bogenoemde doelwitte te bevredig. Die eerste deel van die analise is op 'n enkel verteenwoordigende maatstaf gebaseer wat 'n gemiddelde van die drie-jaar opswaai en drie-jaar afswaai-fases onderskeidelik verteenwoordig. Gemiddelde en mediaanwaardes is vir die KI en AI ondernemings vir die opswaai- en afswaai-fases bereken. 'n Profiel-analise gebaseer op Hotelling se T^2 toets is gebruik om die verhoudingsgetalle wat benaderd normaal verdeel is, te ontleed. Die nie-parametriese toetse "Mann-Whitney U-test" en "Wilcoxon matched-pairs test" is gebruik om die verhoudings wat nie benaderd normaal verdeel is nie, te ontleed.

Die tweede deel van die studie fokus op 'n analise van die verhoudingsgetalle wat op die individuele jare van die navorsingsperiode gebaseer is. Die statistiese tegnieke wat in die analise van die verhoudingsgetalle gebaseer op 'n enkel verteenwoordigende maatstaf gebruik is, is ook vir die analise van die verhoudingsgetalle gebaseer op die individuele jare gebruik. Die beperkings wat deur die analise gebaseer op 'n enkel verteenwoordigende maatstaf geïdentifiseer is, word tot 'n groot mate in hierdie afdeling van die statistiese analise aangespreek. Deur die gemiddelde en mediaanwaardes gebaseer op die individuele jare te ontleed, is dit moontlik om die verhoudingsgetalle as een van 'n aantal patroongroepe, naamlik normaal verwagte, sloer-, lei-, sikliese en gemengde patrone, vir die KI en AI ondernemings te klassifiseer. Die patrone van 'n verskeidenheid van verhoudingsgetalle binne elk van die patroongroepe word ook uit 'n finansiële bestuursperspektief ontleed.

Die bevindings van die studie bevestig die gestelde hipotese dat daar verskille in die gedrag van finansiële verhoudingsgetalle, gebaseer op 'n enkel-verteenwoordigende maatstaf en vir individuele jare van die navorsingsperiode, tussen KI en AI ondernemings gedurende een of albei van die opswaai- en afswaai-fases van die ekonomiese siklus is.

Die analise beklemtoon verder dat 'n aantal verhoudingsgetalle wat op 'n enkel verteenwoordigende maatstaf gebaseer is, nie universeel vir alle ondernemings en slegs gedurende óf 'n opswaai- óf 'n afswaai-fase van die ekonomiese siklus gebruik kan word nie. Verhoudingsgetalle wat deel van hierdie kategorie vorm, sluit ondernemingsrentabiliteit (voor belasting), rentabiliteit van totale netto vaste- en bedryfsbates, dividend per aandeel, verkope tot totale netto bates, en rentedraende skuld tot totale aandeelhouersbelang in.

Die resultate gebaseer op die individuele jare van die analise toon dat die oorgrote meerderheid van die verhoudingsgetalle normaal verwagte patrone volg. Van die tradisionele winsgewindheidsverhoudingsgetalle vertoon 80% normaal verwagte patrone vir die KI en AI ondernemings gedurende die opswaai- en afswaai-fase. Tradisionele winsgewindheids-verhoudingsgetalle soos ondernemingsrentabiliteit, rentabiliteit van netto vaste- en bedryfsbates, rentabiliteit van eie kapitaal en die waardeskeppingsverhoudingsgetal EVA, vorm deel van die normaal verwagte groep van patrone. Al die inflasie-aangepaste verhoudingsgetalle toon ook normaal verwagte patrone. Hierdie groep van verhoudingsgetalle toon relatiewe stabiliteit gedurende die ekonomiese siklus en is vir medium- en langtermyn finansiële vooruitskatting geskik omdat hulle die besigheidsiklus volg. Ongeveer 39% van die verhoudingsgetalle toon gemengde patrone, m.a.w. verskillende patrone vir die KI en AI ondernemings. Die groei in verdeelbare inkomste, kontantvloei tot rentebetalings, markwaarde van aandeelhouersbelang tot boekwaarde van aandeelhouersbelang en mark-toegevoegde waarde verhoudingsgetalle toon gedragspatrone vir die KI en AI ondernemings wat moontlik die ekonomiese siklus kan lei. Hierdie verhoudingsgetalle mag 'n aanduider van verwagte opswaai- en afswaai-fases in die ekonomiese siklus wees.

Die relevansie van die resultate vir KI ondernemings dui op die groter gebruik van vreemde kapitaal gedurende die afswaai-fase om kostes en bedryfskapitaal behoeftes te dek wanneer die vraag na produkte en dienste afneem as gevolg van 'n daling in die ekonomie. Die patroon wat deur verdienste per aandeel aangedui word, gee 'n moontlike aanduiding van 'n verwagte opswaai-fase in die ekonomiese siklus. 'n Toename in die kontantvloei-tot-rentebetalingsverhoudingsgetal gedurende die afswaai-fase mag 'n aanduider van 'n naderende opswaai in die ekonomiese siklus wees.

Die relevansie van die resultate vir AI ondernemings toon dat 'n opswaai in die ekonomiese siklus deur 'n toename in die bedryfskapitaal tot kontant uit ondernemingsaktiwiteite verhoudingsgetal verwag kan word. Meer vreemde kapitaal word gedurende die opswaai-fase gebruik wat aan 'n toename in die vraag toegeskryf kan word en gevolglik tot 'n hoër hefboomsituasie vir AI ondernemings lei. 'n Toename in die kontantvloei tot die rente betaal verhoudingsgetal gedurende die afswaai-fase mag 'n aanduider van 'n naderende opswaai in die ekonomiese siklus wees.

'n Aantal beperkings van die studie sluit in: die gebruik van 'n enkele opswaai- en afswaai-fase wat die ekonomiese bewegings verteenwoordig; die benadering wat gevolg is om tussen die KI en AI ondernemings te onderskei benodig verdere ondersoek; en die groot aantal verhoudingsgetalle kan in toekomstige studies tot 'n sekere aantal indikatore beperk word.

Die belangrikste aanbevelings van die studie sluit in: die gebruik van veelvoudige opswaai- en afswaai-fases van die ekonomiese siklus; meer navorsing op die sloer- en leipatrone wat deur die KI en AI ondernemings vir spesifieke verhoudingsgetalle getoon word; die moontlikheid om 'n ander benadering te volg om tussen KI en AI ondernemings te onderskei, kan oorweeg word; en verdere navorsing word benodig om die betroubaarheid te bepaal van die indikatore wat dui op leipatrone wat 'n opswaai- of afswaai-fase in die ekonomiese siklus kan voorspel.

DEDICATION

This dissertation is dedicated to my parents

Aubrey and Grace Bloom

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LIST OF FREQUENTLY USED ABBREVIATIONS

Abbreviation	Description
"b"	Beta coefficient
"B"	Retention rate
"g"	Growth rate
AC	Accounting Guideline
AEVA	Adjusted economic value added
AIS	Inflation-adjusted income statement
BS	Balance sheet
BFA-NET	Bureau for Financial Analysis Network
BVD	Book value of debt
BVE	Book value of equity
CAPM	Capital Asset Pricing Model
CATA	Cash available from total activities after interest and tax
CF	Cash flow
CFS	Cash flow statement
CI	Capital intensive
CIA	Cash utilised for total investment activities
COA	Cash from operating activities
CPI	Consumer price index
CTA	Cash from total activities before interest and tax
DPS	Dividend per share
EBIT	Earnings before interest and tax
EC	Combined measure
EDA	Exploratory Data Analysis
EI	Economic income
EMP	Number of employees
EPS	Earnings per share
EPS_{real}	Earnings per share (adjusted for inflation)
EVA	Economic value added
FCF	Free cash flow
FIFO	First-in-first-out
G	Growth ratios
GAAP	Generally Accepted Accounting Practice
GDP	Gross Domestic Product
IS	Income statement
IGR_{1-t}	Internal growth rate after tax
INF	Inflation-adjusted ratios
JSE	Johannesburg Stock Exchange
K	Earnings yield
K_d	Cost of debt
K_e	Cost of equity
LI	Labour intensive
LIFO	Last-in-first-out
Log	Logarithm
MA	Monetary assets
ML	Monetary liabilities
MVA	Market value added
MVD	Market value of debt
MVE	Market value of equity
NCTA	Net cash from total activities
NFA	Net fixed assets
NIM	Net income margin before tax
NIM_{real}	Net income margin (adjusted for inflation)
NMA	Net monetary assets
NML	Net monetary liabilities
NOPAT	Net operating profit after tax
NPV	Net present value

P	Profitability ratios
PE	Price-earnings
PPI	Production price index
Q-ratio	Tobin's Q-ratio
RNOA	Return on net operating assets before tax
ROCE	Return on capital employed
ROD	Return on debt
ROE	Return on total shareholders' interest before tax
ROE_{1-t}	Return on total shareholders' interest after tax
ROE_{real10}	Return on total shareholders' interest (10-year average age for land and buildings)
ROE_{real5}	Return on total shareholders' interest (5-year average age for land and buildings)
ROI	Return on investment
RONA	Return on total net assets before tax
$RONA_{1-t}$	Return on net operating assets after tax
$RONA_{real10}$	Real return on total net assets (10-year average age for land and buildings)
$RONA_{real5}$	Real return on total net assets (5-year average age for land and buildings)
$RONA_{t-1}$	Return on total net assets after tax
ROS	Return on sales before tax
ROS_{1-t}	Return on sales after tax
ROSE	Return on ordinary shareholders' interest before tax
$ROSE_{1-t}$	Return on ordinary shareholders' interest after tax
$ROSE_{real10}$	Return on ordinary shareholders' interest (10-year average age for land and buildings)
$ROSE_{real5}$	Return on ordinary shareholders' interest (5-year average age for land and buildings)
ROS_{real}	Return on sales (adjusted for inflation)
SGR	Sustainable growth rate
SGR_{1-t}	Sustainable growth rate after tax
SVA	Shareholder Value Approach
TA	Total net assets
TC	Total capital
V	Value ratios
VA	Value added
WACC	Weighted average cost of capital
WCV	Warranted capital value
WEC	Warranted equity value
XMA	Non-monetary liabilities
XML	Non-monetary liabilities

CHAPTER 1

INTRODUCTION: BACKGROUND, OBJECTIVES AND OVERVIEW

1.1 Background to the study

Today's business environment has placed unprecedented pressure on decision-makers to perform adequately in an expanding world economy. Planners and managers are faced with the dilemma of operating in a business system that is more competitive, the lead time to enforce or implement business decisions is longer and information is abundant. Notwithstanding this, an enterprise does not function in a vacuum, but needs to contend with various uncontrollable macro environmental factors (e.g. industry and globalisation effects) and an increase in the expectations of internal and external stakeholder groups such as shareholders, who require an exemplary annual financial performance.

The nature of an enterprise generally determines the manner in which it responds to external environmental factors such as fluctuations in the economic cycle. The current and future state of economic growth in a country, which is measured by the Gross Domestic Product (GDP), may also influence the financial performance of an enterprise. Less favourable trading conditions caused by a general decline in business activity could have significant consequences for both management and shareholders.

For the purposes of this study an upswing phase (1987-1989) of three years and a decline phase (1990-1992) of three years have been selected after an analysis of the economic cycle over the period 1970 to 1996 (South African Reserve Bank, 2000: S-146). The annual GDP figures at constant 1995 prices as quoted by the South African Reserve Bank are used for the purposes of identifying the research period. The period for the research has been selected for the following reasons. Prior to 1986 the selection of an upswing and decline phase would have been impractical, firstly due to the immediately preceding upswing and decline phases lasting only one and two years respectively and, secondly, it would not have been possible to calculate the cash flow ratios for an enterprise. The BFA-NET database used in the research

only provides cash flow statements for the majority of the selected enterprises from 1987. An upward phase (1993-1996) of the economic cycle after 1992 also lasting only three complete years, prior to the commencement of the research.

Further consideration is given to a distinction between the capital intensive (CI) and labour intensive (LI) nature of an enterprise. For instance, enterprises that are more CI (e.g. Steel and Allied and Chemicals, Oils and Plastics) may be affected in a different manner to those which are more LI (e.g. Clothing and Textiles) during an upswing and decline phase of the economic cycle. The distinction between CI and LI enterprises is based on the analysis of the total net assets, fixed assets and number of employees of the selected enterprises. It should be noted that there is no uniform approach evident in the literature to distinguish between CI and LI enterprises. Notwithstanding this, an attempt is made to distinguish between CI and LI enterprises in this study by adopting and applying a responsible approach. The net fixed assets to total assets (NFA:TA) and net fixed assets to number of employees (NFA:EMP) ratios are used to reflect capital and labour intensity. A logarithm is used to bring the values of the NFA:EMP closer together, after which both ratios are standardised. A scatterplot is used to visually investigate the positioning of each enterprise in one of four quadrants. A Euclidean Distance measure is calculated for each enterprise based on the two ratios. A scale is constructed from the Euclidean Distance to reflect the relative intensity of the capital intensive versus labour intensive nature of an enterprise. The more negative the scale-value of the enterprise, the more labour intensive its nature. Conversely, the more positive the scale-value of the enterprise the more capital intensive its nature. Enterprises within the 25% and lower 25% of the scale are included in the analysis. Consequently, enterprises with scale values larger than 0,95 and less than –0,95 are included in the analysis. It is possible to distinguish between 33 capital intensive and 36 labour intensive enterprises.

Financial performance ratios are generally applied to a set of financial statements without taking cognisance of those external and internal factors that could affect the measurement of performance. The behaviour of financial performance indicators during an upswing and decline phase of the economic cycle, together with the nature and scope of an enterprises activities may have an effect on the manner in which financial performance indicators are used by an enterprise. The question may arise whether or not a ratio's behaviour for CI and LI enterprises could capture the essence of external factors such as an upswing or decline in the

economic cycle. A challenge for many enterprises is to determine a sound basis for the measurement of financial performance in the most accurate manner possible by taking cognisance of external factors that may affect their financial well-being.

The application of evaluation procedures should culminate in an integrated understanding by all stakeholders of the enterprise's use of financial indicators, which provide information on level (operational or strategic), trend (long-term patterns in key financial performance indicators) and future behaviour (use of indicators to forecast financial performance). It appears that the challenge for managers is to enhance their understanding of the content of financial indicators in a manner that contributes to the choice of the most appropriate indicator under particular circumstances. The latter refers to the identification and selection of indicators which are sensitive to the nature of an enterprise's activities and also capture the essence of an upswing and decline phase of the economic cycle. The approach proposed in this study provides a different perspective on financial performance measurement by considering the CI and LI nature of an enterprise together with an upswing and decline phase of the economic cycle.

1.2 Objectives of the study

1.2.1 Primary objectives

- To distinguish between the CI and LI nature of enterprises listed in the industrial sector of the JSE by using measures of capital and labour intensity;

- To obtain patterns and identify differences in the behaviour of selected financial indicators between CI and LI enterprises during an upswing (1987-1989) phase and a decline (1990-1992) phase of the economic cycle, as measured by the GDP;

- To analyse and investigate patterns and differences to determine whether or not there is specific justification(s) for the behaviour exhibited by the CI and LI enterprises for a particular ratio during either or both the upswing and decline phases of the economic cycle;

- To identify key financial indicators which could possibly be used by CI and LI enterprises to forecast financial performance and to identify leads and lags in the economic cycle;

1.2.2 Secondary objectives

- To select a relevant period in the economic cycle that represents an upswing phase followed by a decline phase or vice versa;

- To analyse companies listed in the industrial division of the JSE, which adhere to specified selection criteria, for inclusion in a CI and LI portfolio of enterprises.

1.3 Hypotheses

H_{01}: There are no differences in the behaviour of financial indicators based on a single representative measure between CI and LI enterprises during an upswing and decline phase of the economic cycle.

H_{02}: CI and LI enterprises exhibit similar behaviour patterns for ratios when the analysis is based on the individual years of the research period.

1.4 Scope of the study

The research is based on an assessment of five categories of financial indicators, i.e. traditional profitability, growth, cash flow, value and inflation-adjusted ratios, which are generally used to measure financial performance of an enterprise. An analysis is also conducted to determine which enterprises listed in the industrial division of the Johannesburg Stock Exchange (JSE) and also adhere to certain selection criteria could be classified as part of the independent CI or LI enterprise groups. The ratios identified previously as part of the five groups are calculated for the CI and LI enterprises for the specified upswing and decline phase of the economic cycle.

A descriptive statistical analysis and Exploratory Data Analysis (EDA) are used to analyse mean and median patterns exhibited by the CI and LI enterprises for each selected financial ratio based on a single representative measure during the upswing and decline phases of the economic cycle. Further research includes an analysis of the median profiles using non-

parametric statistical techniques such as Mann-Whitney U-test and Wilcoxon matched-pairs test and mean profile analysis based on Hotelling's T^2 test for ratios which indicate approximate normal distributions. These techniques are used to determine statistically significant differences between the behaviour of the ratios for the CI and LI enterprises during the upswing and decline phases. The mean and median patterns of the CI and LI enterprises are also analysed for the individual years of the analysis. Different pattern types are determined by analysing the mean, adjusted mean or median pattern of the ratios for the CI and LI enterprises. The patterns of the various ratios within each of the pattern groups are also analysed from a financial management perspective.

1.5 Research methodology

1.5.1 Analysis of secondary literature

A number of publications, documents and articles which emanate from international and local sources form the basis of the literature used in the study. A variety of topical publications available at university libraries and from specialist institutions and consultancies in the financial services field are sourced and analysed. The secondary literature review focuses specifically on measures that could be used to determine the capital or labour intensity of an enterprise. The literature analysis also provides further information on individual and groups of indicators relevant for financial performance measurement.

1.5.2 Primary research

The primary research and analysis consists of two phases. The first phase encompasses three parts. Part one entails an analysis of the economic cycle and the identification of an appropriate upswing and decline phase. The second phase involves the selection of a sample of industrial enterprises listed on the JSE. The selected enterprises are classified as CI or LI on the basis of two measures that represent capital intensity and labour intensity respectively. The third part of the first phase involves the calculation of the selected financial ratios identified during the analysis of the secondary literature. The standardised financial statement data required to calculate the selected financial ratios were obtained from the Bureau for Financial Analysis (University of Pretoria) database of JSE-listed companies (Bureau for Financial Analysis, 1997).

The second phase of the primary research involves an analysis of the mean and median profiles compiled for the CI and LI enterprises. A single representative mean or median measure, which represents an average of the three-year upswing and three-year decline period, is used for the analysis. Statistically significant differences in the behaviour of the financial performance indicators between CI and LI enterprises are determined by using non-parametric statistical techniques and an analysis of the mean profile using Hotelling's T^2 test. A similar analysis is also conducted of the mean and median patterns based on the individual years of the research period. The patterns exhibited by the individual ratios are classified as part of a particular group and further analysed from a financial management perspective.

1.6 Important terminology used in the text

Adjusted mean profiles are graphic representations that are compiled from the adjusted mean values determined for each of the CI and LI enterprises for the upswing and decline phases based on the individual years of the research period after possible outlier values are no longer considered in the analysis.

Cash flow performance indicators are based on the cash flow statement and use financial magnitudes from the income statement and the balance sheet to determine the flow of cash over time.

Capital intensive enterprises are perceived to have a high ratio of net fixed assets to total net assets (NFA:TA) and a high ratio for net fixed assets to the number of employees (NFA:EMP).

Descriptive Analysis, which includes descriptive statistics and graphs, is a procedure which allows one to review a variable(s) with the aid of specific descriptive statistics of central tendency (e.g. the median and mean), measures of dispersion (e.g. the standard deviation and the inter-quartile range) as well as skewness and kurtosis.

Economic cycle for the purposes of this study refers to an upswing and a decline phase both comprising three years, which is associated with an annual increase or decrease in the GDP as quoted by the South African Reserve Bank (2000: S-146).

Exploratory Data Analysis is a process used to identify systematic relationships between variables when there are no (or not complete) *a priori* expectations as to the nature of those relationships.

Inflation-adjusted performance indicators are calculated from adjusted income and balance sheet statements and provide a real perspective on the effect that inflation has on an enterprise's financial performance.

Labour intensive enterprises are perceived to have low ratios for both net fixed assets to total net assets (NFA:TA) and net fixed assets to total number of employees (NFA:EMP).

Mean profiles are graphic representations that are compiled from the mean values determined for each of the CI and LI enterprises for the upswing and decline phase and are based on a single representative measure and the individual years of the research period. The profile analysis using Hotelling's T^2 test are only applicable to ratios that exhibit approximate normal distributions and are used to determine whether or not the CI and LI profiles are parallel; if the profiles are parallel, are they coincident, and under the acceptance of parallelism, are the profiles horizontal?

Median profiles are graphic representations that are compiled from the median values determined for the CI and LI enterprises covering an upswing and decline phase of the economic cycle. The median is not sensitive to outliers. The profiles are based on a single representative measure (i.e. a median of the averages for the three-year upswing and decline phases) and the individual years of the research period.

Net operating assets for the purposes of this study consist of fixed assets at book value and net current assets (current assets less current liabilities) after deduction of short-term loans advanced as defined by the Bureau for Financial Analysis.

Non-parametric methods also known as parameter-free techniques that do not rely on the estimation of parameters such as the mean and standard deviation, which are required to describe the distribution of the population. These methods are also not sensitive to influential or outlier values.

Notched box and whisker plots are graphic representations of the distribution of a variable that provide an indication of possible outlier values, a measure of central tendency, skewness and variation as well as an approximate 95% confidence interval for the median. This confidence interval could also be used in an approximate test to determine whether or not two medians of independent samples indicate statistically significant differences at a 5% significance level.

Single representative measure is either a mean or median value for the CI and LI groups of enterprises, which is obtained from the average of the three years comprising the upswing phase and the three years comprising the decline phase of the economic cycle.

Total net assets for the purposes of this study consist of fixed assets at book value, total external investments and net current assets (current assets less current liabilities).

Traditional performance indicators refer to financial ratios that are generally used by enterprises to measure financial performance and are determined by using information generated by the income statement and the balance sheet.

Value-added performance indicators highlight the ability of an enterprise to achieve a higher return on capital than the cost of capital.

Working capital in this study refers to either working capital in the balance sheet or the cash flow statement. The balance sheet definition of working capital is net current assets (current assets less current liabilities). The cash flow definition of working capital encompasses the financial items stock, debtors and creditors.

1.7 Factors which constrained the study

The following factors constrained the study:

- The financial statements of the enterprises contained in the BFA-NET standardised database could not be used in their present form due to the specific requirements of the research (e.g. the cash flow statement in the BFA-NET database was restructured). For this reason, a user-defined set of financial statements has been compiled and applied to each selected enterprise in the BFA-NET standardised database. However, not all the relevant information required to compile the user-defined statements is available in the database (e.g. all the adjustments for inflation).

- The task of understanding the method of standardisation used in the BFA-NET database was time consuming as a different approach is used to compile and standardise the financial statements (see Chapter 6 for adjustments made to certain BFA-NET financial statement items).

- The database includes a diverse number of financial performance indicators. However, these indicators as calculated by BFA-NET are not used in their current form, as they do not adhere to the user-defined requirements prescribed for the study. In certain cases, it was difficult to determine whether or not a ratio was calculated on a pre- or after-tax basis.

- All the inflation adjustments as highlighted by AC201 are not provided by the BFA-NET database. Only the depreciation adjustment is provided as part of the Sundry item section in the database. The adjustment for cost of sales and the gearing adjustment are also calculated with the aid of financial items available in the database and from other sources.

- As is common in most research pertaining to financial performance, incomplete information and information not provided due to non-disclosure inhibited the use of certain ratios due to a low count of data points. For instance, a financial year may cover a period in excess of 12 months due to a new financial year-end as indicated by BFA-NET, while in other cases turnover figures are not disclosed or dividends are not declared for a particular year.

- No standard or universal measure for capital intensity and labour intensity is reflected in the literature. This limitation necessitates the use of a different approach to distinguish between CI and LI industrial enterprises listed on the JSE (see Chapter 5).

1.8 Structure of the study

The study consists of nine interrelated chapters. A graphic representation of the structure of the study is provided in Figure 1.1. Chapter 1 entails a broad overview of the study. Aspects of the research covered in this chapter include a broad background, the primary and secondary objectives, the hypothesis, scope of the study, research methodology, terminology, factors that inhibited the research as well as a general structure and an overview of the contents of the various chapters.

The following three chapters form the basis for the discussion of the traditional profitability, growth, cash flow, value added and inflation-adjusted categories of financial ratios. The focus in each chapter is to highlight possible ratios within each category that could be regarded as appropriate and relevant for purposes of the analysis.

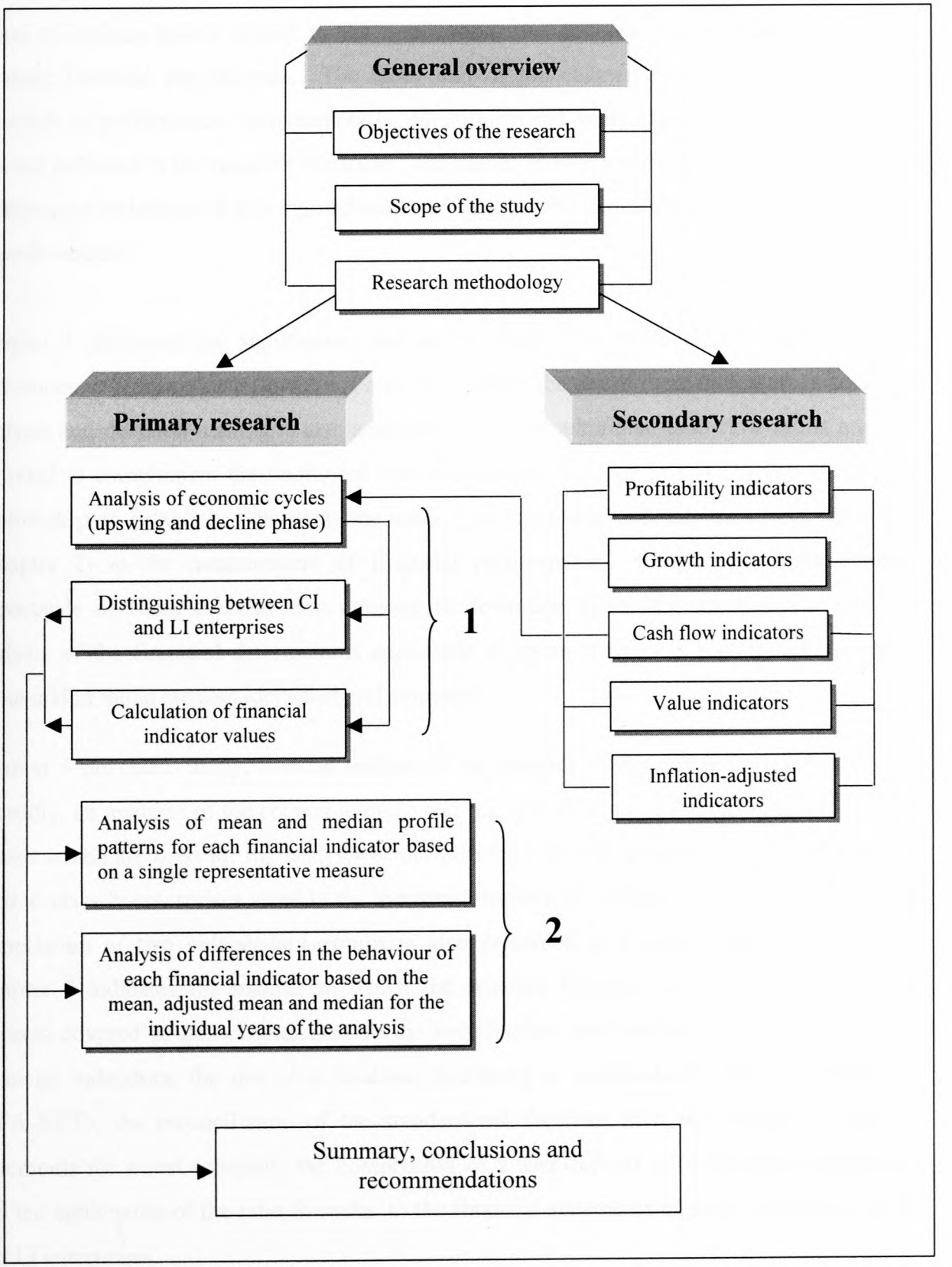


Figure 1.1: A graphic representation of the scope and structure of the study. **1:** First phase of primary research; **2:** Second phase of primary research

The first part of Chapter 2 defines the concept of financial performance and provides a broad scope of various issues related to the application, use and analysis of ratios required to measure financial performance. The latter half of the chapter focuses on the traditional approach to performance measurement by identifying and analysing various financial ratios that are reflected in the research literature. The use of growth and inflation-adjusted financial performance indicators is also highlighted in addition to the traditional profitability indicators of performance.

Chapter 3 addresses the significance and use of cash flow ratios to determine financial performance. Various cash flow ratios are analysed and the use of these indicators in financial analysis and decision-making is also addressed. Several additional cash flow ratios are also included to complement the traditional cash flow ratios analysed in this chapter. Finally, a relationship is established between the cash flow approach and the traditional approach (Chapter 2) to the measurement of financial performance. Chapter 4 emphasises the importance of value creation as a measure to determine financial performance. A broad analysis of the financial determinants applicable to value creation is highlighted. Various value-added ratios are also identified and analysed.

Chapter 5 provides, firstly, a broad outline of the research design for the primary analysis; secondly, an analysis of the economic cycle and the specification of the upswing and decline phases which are used for the analysis of the selected ratios is conducted. The methodology used to classify enterprises listed in the industrial division of the JSE as CI or LI and the final compilation of two independent groups is also presented in the latter part of Chapter 5. Chapter 6 indicates the manner in which the selected financial indicators are calculated. Aspects covered in this chapter include the specification and method used to calculate the financial indicators, the use of a database consisting of standardised financial statements (BFA-NET), the reconciliation of the standardised database with the published financial statements for a test company, the compilation of a user-defined set of financial statements and the application of the ratio formulae to the financial statements of each of the selected CI and LI enterprises.

Chapters 7 and 8 present the results obtained from an analysis which considers the selected ratios together with the CI and LI nature of an enterprise and the upswing and decline phases

of the economic cycle. The findings presented in Chapter 7 are based on a single representative measure. Mean and median profiles are compiled for each ratio and are based on a single representative measure. The median profile patterns are categorised and analysed for expected and unexpected trends. Initial differences between the CI and LI enterprises during either or both the upswing and decline phases of the economic cycle are also identified from the use of box and whisker plots. Non-parametric statistical techniques are used to identify statistically significant differences between CI and LI enterprises from the median profiles. An analysis of the mean profile based on Hotelling's T^2 test for each ratio which adheres to the required assumptions is also used to determine statistically significant differences between CI and LI enterprises. An initial interpretation of the mean and median profile results, where relevant, is also provided from a financial management perspective.

The findings presented in Chapter 8 are also obtained by applying the same statistical techniques used to analyse the data described in Chapter 7. The mean, adjusted mean or median patterns exhibited by the ratios are classified into groups. The patterns of the more important ratios within each of the pattern groups are also discussed from a financial management perspective. A mean profile analysis as discussed in Chapter 7 is also used to analyse those ratios that have approximate normal distributions.

Chapter 9 provides a summary, several conclusions and recommendations regarding the measurement of financial performance, the further use of the approach suggested in this study and additional research challenges.

CHAPTER 2

THE TRADITIONAL APPROACH TO THE MEASUREMENT OF FINANCIAL PERFORMANCE

2.1 Introduction

The financial performance of both CI and LI enterprises during upswing and decline phases of the economic cycle forms the basis for many decisions made by internal and external stakeholders, who include management, investors and employees. Fundamental analysis encompasses financial performance measurement and includes, among other things, an analysis of the enterprise's financial data, its management, the competition, market conditions, industry and globalisation effects, the economy and the business sector. In this manner the current and past financial status of the enterprise is analysed in order to determine whether or not financial growth targets have been achieved and what effect the results may have on the long-term financial position and survival of the enterprise. Various financial ratios are generally used together with a detailed analysis of internal and external causal factors to evaluate the financial performance of the enterprise.

This chapter is subdivided into three parts. Part one provides a basis for the analysis of financial ratios by highlighting various issues such as standardisation and benchmarking. An understanding of financial performance is provided, while general categories of financial ratios used to measure financial performance are emphasised. In addition, issues related to financial performance measurement are highlighted. Part two of the analysis focuses on the traditional approach to financial performance measurement. Various traditional financial indicators used to analyse financial performance are identified and their relevance determined for measuring a particular aspect of the enterprise's financial position. A brief indication of the incremental approach to financial performance measurement is also provided. A critical analysis of the traditional approach is provided in part three. Particular emphasis is placed on the relative importance of traditional indicators, an application of evaluation criteria to

selected indicators and the identification of critical pointers which may affect the use and application of traditional performance measurement.

2.2 Scope of financial ratio analysis

2.2.1 Significance of and need for financial indicators

Financial ratios are generally used to evaluate and assess the performance of an enterprise at a specific point in time or over a particular financial period. Various strategic and operational aspects can be analysed by using financial ratios and major areas of concern can be identified within the enterprise. The challenge for financial planners is to select financial ratios that are applicable and relevant to an analysis of the current financial situation. A large number of financial ratios can be used to measure financial performance; however, financial analysis often results in the calculation of ratios which have little explanatory power or have no relevance for analysing a particular aspect of the enterprise's financial position.

Typically, the analysis of financial statements is an application of "management by exception" (Ross, Westerfield and Jordan, 1993: 75). In many cases financial analysis entails comparing ratios of one enterprise to that of a peer, an appropriate industry average or selected norm. Financial ratios therefore have both an internal and external application, hence the need to also consider the CI and LI nature of an enterprise's activity and the upswings and declines in the economic cycle.

2.2.1.1 Internal application

The information obtained from the analysis of financial statements is of particular importance to various internal stakeholders such as management and employees. Primarily, the information provided by financial ratios is useful for analysing the enterprise's financial performance and for evaluating among other things, management effectiveness, operational efficiency, productivity levels and the efficient use of capital. Information obtained from financial ratios also serves as an input guideline for determining future profitability levels, earnings and the cash flow potential of the enterprise.

2.2.1.2 External application

Financial ratios are useful for external stakeholders such as short-term creditors and long-term investors. Short-term creditors, for example, would use financial information to decide whether or not to provide or extend credit to an enterprise. An additional use of financial ratios is to evaluate the financial performance of an enterprise against selected industry benchmarks. Financial ratio information further assists the enterprise to make decisions regarding the possible acquisition of a new business and to determine an appropriate offer to purchase.

2.2.2 Relevance of indicators for measuring financial performance

Performance measurement plays a significant role in the management of most enterprises. It is therefore important to understand clearly how financial ratios should be used and their relevance for measuring financial performance. McTaggart, Kontes and Mankins (1994: 320) highlight two fundamental applications for financial performance measures. Firstly, financial performance measurement could be used as an aid for strategy development. This refers specifically to judgement of which alternative strategies for the enterprise would potentially have higher value than the current strategy. Secondly, financial performance measurement could be used as an aid for monitoring and rewarding performance. Stakeholders, for example, would be interested in information about how well the enterprise has performed.

Financial performance indicators should preferably not be used to make strategic investment decisions (McTaggart *et al.*, 1994: 323). Relative value is the only test that should be used for evaluating strategic alternatives in the context of maximising shareholder value. Direct comparisons of relative value should be made, for instance, when considering a capital investment or take-over decision and would be based on a comparison of the value of the enterprise with the investment as opposed to the value of the enterprise without the investment. The incremental cash flow of the project should therefore be considered.

2.2.3 Interpretation and analysis of financial statements

The nature of accounting policies often complicates the analysis of financial statements and subsequent comparisons between enterprises within a business sector. For example, different

enterprises use different valuation procedures for inventory or different methods of depreciation of fixed assets, which makes financial statements difficult to compare. Du Plessis and Mostert (1997: 138) indicate other problem areas that may hinder comparisons of the financial position of various enterprises:

- Accumulated tax losses, which have implications for future profits, are not shown in the balance sheet. Their effect on the income statement and balance sheet should be taken into account. Accumulated tax losses will be reflected in a reconciliation of the tax rate.
- Often some of the most important assets in an enterprise such as skilled management, while they have a decisive influence on the investment merits of the specific enterprise, are difficult or even impossible to quantify.
- The increase in the market value of assets, especially property, during times of high inflation is often not reflected in the financial statements.
- Subjective judgement is an important part in the evaluation of items such as the recovery of debtors, saleability of stock and the accounting, economic, physical and technological lifespan of assets.
- The current value of assets and certain liabilities is not reflected in the financial statements.
- The effective tax rates vary from enterprise to enterprise. These tax inconsistencies are caused by, among other things, regional development rebates, investment rebates, accumulated losses, income from investments and training rebates, and are reflected in a reconciliation of the tax rate.
- Each enterprise is unique, and therefore standard norms should be interpreted with caution.

2.2.4 Standardising financial statements and selecting appropriate benchmarks

An evaluation of financial performance is generally not a one-dimensional exercise, but relates to a comparison of the enterprise's financial position over time. Moreover, in order to compare the financial performance of an enterprise to that of its competitors on a cross-sectional basis requires modification of certain financial information. The financial

statements of the enterprises included in the analysis should be standardised in order to ensure the relevance and reliability of financial information and conduct appropriate comparisons.

2.2.4.1 Standardisation of financial statements

Financial statements can be standardised by using several methods. Firstly, it is possible to express the financial information in the balance sheet as a percentage of total assets. Secondly, the financial information in the income statement could be expressed as a percentage of turnover. These statements are referred to as common size statements (Ross *et al.*, 1993: 57).

However, if the purpose of the analysis is to conduct longitudinal research, it may be more appropriate to adjust the financial information of the enterprise to a base year. This analysis enables the management to identify short-term and long-term financial trends and may further indicate various internal and external organisational factors which affected the enterprise over the past number of years. Ross *et al.* (1993: 59) refer to these types of financial statements as common base-year statements.

The possibility of standardising various items in the financial statements across all the enterprises included in an analysis should also be considered. The following examples are financial statement items, which may differ among enterprises:

- Cash balances in certain instances are netted off against the bank overdraft. By adding back the cash balances, the cash position of each enterprise can be compared. Tax paid in advance is also often netted off against tax payable. However, it appears that interest received and paid is not nowadays generally indicated as a net amount by companies.

- Cost of control and intangible assets such as goodwill, patents and licences are regarded as fictitious assets and are not necessarily included as part of total assets when the latter figure is calculated for analytical purposes. However, in certain cases enterprises deduct intangible assets from total shareholders' interest.

- Stock is normally valued by using one of several possible methods. If the last-in-first-out (LIFO) method is used by the enterprise, a readjustment of LIFO may be considered to reflect first-in-first-out (FIFO) or average value, if this figure is disclosed in the financial statements.

- A decision needs to be made whether or not to subtract or add extraordinary profit or losses from the before or after tax income figure. This is required in order to standardise the pre-tax income in the income statement. A clear distinction should be made between extraordinary items and abnormal profit and losses, which are generally regarded as a pre-tax income or expense items for the enterprise.

The standardisation procedure used to obtain uniform financial statements should be reliable and consistent to ensure appropriate comparisons of financial data. This in turn provides acceptable inferences of financial performance and reliable measures for judging financial success.

2.2.4.2 Selecting appropriate comparative time frames and benchmarks

Corporate financial performance can be assessed on a vertical or horizontal scale (Ellis and Williams, 1993: 204). The latter assesses the enterprise's current financial performance against the performance of previous years. This is appropriately termed time series analysis. Horizontal analysis implies a comparison of the enterprise's financial performance over several financial periods. It is possible that changes in accounting policy and changes in the enterprise's business practices could give the impression of a very healthy short-term position or a deteriorating liquidity position (Ross *et al.*, 1993: 76). Although no prescriptive time frame exists for financial performance analysis, a seven- to ten-year period is generally considered to be acceptable.

Vertical analysis, which is aptly termed inter-enterprise comparisons or benchmarking, enables an enterprise to compare its financial performance to several other enterprises. In order to conduct cross-sectional comparisons, an appropriate sample of peer enterprises should be selected as a benchmark. According to Ross *et al.* (1993: 76) this process is referred to as peer group analysis. The selected enterprises should preferably compete in the

same markets, have similar asset structures and accounting policies, and generally operate in a comparable manner (Ellis and Williams, 1993: 206; Winicur, 1993: 6).

2.3 Understanding financial performance measurement and long-term survival

An analysis of financial performance generally involves an evaluation of the financial success of an enterprise and its ability to survive over the long term. However, the particular financial measurement approach and the type of information used for financial performance analysis forms the basis for evaluating financial success. Ernst and Ross (1993: 5) acknowledge a statement by an economist who argues that "all knowledge is about the past, but all actions are about the future". This statement implies that business actions are often analysed in terms of the "after-fact control", because past financial information is assessed and compared to some industry norm or peer group standard. An adequate understanding of the concept of financial performance and the manner in which financial results are analysed and interpreted becomes important in the context of the measurement process.

2.3.1 Criteria for measuring financial performance

Financial performance could be interpreted in various ways and measured at a range of scales. In addition, financial performance measurement is regarded as a general evaluation procedure, which is required to determine the financial performance of the enterprise. The measurement of an enterprise's financial success is related to a specified financial objective, industry norm or benchmark as well as a particular measurement approach and objective. For instance, certain enterprises may decide to evaluate the quality of management by analysing several specific financial ratios (Parker and Hartley, 1991). Other financial performance analysis may focus on the effects of strategy implementation on organisational structure (Hamilton and Shergill, 1992).

General performance evaluation criteria which may provide a guideline for contributing to an all-inclusive process for assessing the financial success of both CI and LI enterprises require answers to, inter alia, the following questions (Parker and Hartley, 1991; Ross *et al.*, 1993: 61):

- How should an enterprise measure its financial performance?
- What financial performance measures should form part of the measurement process?
- When should a specific financial performance measure be used?
- Should averages or standardisation procedures be used to smooth data that are analysed over the long term?
- What is the ratio intended to measure?
- Why should an interest be shown in this financial indicator?
- What selection trade-off should be made between profitability, growth, cash flow, value and inflation-adjusted indicators of financial performance?
- How should appropriate measures be selected?
- What could a high or low ratio value imply?
- How might such values be misleading?

Research on the measurement of financial performance indicates systematic differences between the size of the financial effect expressed by the financial indicators and the performance of the enterprise (Boyd, 1991: 362). This observation possibly suggests the need to use specific financial instruments/indicators for particular purpose measurements which could be aided by considering the CI and LI nature of an enterprise and whether or not the economy is in an upswing or decline phase. In this way the selected financial ratio would indicate a more appropriate reflection of the actual performance of the enterprise.

The method adopted by the enterprise to measure financial performance, which is specific to each particular situation, warrants a review of the approach to and application of the measurement process. Hamermesh, Anderson and Harris (1983), for instance, clarify financially successful enterprises as those whose five-year average return on total shareholders' interest (ROE) surpasses the industry mean. In contrast, Fruhan (1979) suggests that financial success is achieved when the market value of equity to the book value of equity ratio of an enterprise's shares is greater than one. Ellis and Williams (1993: 57) believe that successful enterprises are those that consistently create significant value through effective management, which requires that net returns on cash flow exceed the cost of capital. Ward (1993: 7) supports this view by suggesting that shareholder value can only be increased if the

appropriately discounted value of the expected future cash flows generated by the investment is greater than the current cost of the investment.

Conversely, if the cost exceeds the return of capital, the enterprise is less successful and manages to destroy and not create shareholder value. The consequences associated with the destruction of shareholder value would not only be damaging in terms of shareholder interest, but also make the enterprise susceptible to the potential threat of a take-over. Ultimately, the performance of the enterprise depends on the orientation and commitment of management to the process of financial performance measurement, whether traditional, cash flow, value or inflation-adjusted indicators are used to assess financial performance.

2.3.2 Link between financial performance and long-term survival

The relationship between financial performance and long-term survival becomes significant, especially in terms of the ability of the enterprise to sustain its financial performance over the long term. Long-term survival may be characterised by satisfactory financial growth over an acceptable period of time by considering any factors which may inhibit or curtail the future financial success of the enterprise. An analysis of financial performance and long-term survival should not only be enhanced by past performance, but also by the future financial expectations of the enterprise. Cooper, France, Lobiondo and Lavin (1994: 40) question where management would begin the complex task of measuring financial performance and determining the effect on the long-term survival of the enterprise.

The dynamic nature of financial performance measurement relies on the adaptability and flexibility of management to anticipate the future position of the enterprise and not continuously base decisions on past performance. A clear differentiation should be made between the financial objectives of the enterprise and the actions needed to attain specified goals. Consequently, managing for growth is quite different from managing for greater cash flow or maximisation of long-term profitability. In this context, if an enterprise does not understand why it succeeds, it will learn why it failed (Cooper *et al.*, 1994: 42). Performance measurement is therefore related to performance management, which implies that the information gained from financial ratios and subsequent analysis should be used in a manner

which enables management to identify key internal (nature of enterprise's activities) and external (phase of the economy) drivers of financial performance.

Financial performance and long-term survival are not limited to the overall success of the enterprise. It is necessary to understand the contribution of operational activities to financial success and long-term survival of the enterprise. Figure 2.1 illustrates the link between the performance of the operational activities, which are analysed by using income statement figures and the financial performance and long-term survival as highlighted in the balance sheet. The latter is measured by the efficient utilisation of both monetary (capital) and non-monetary (skills) resources.

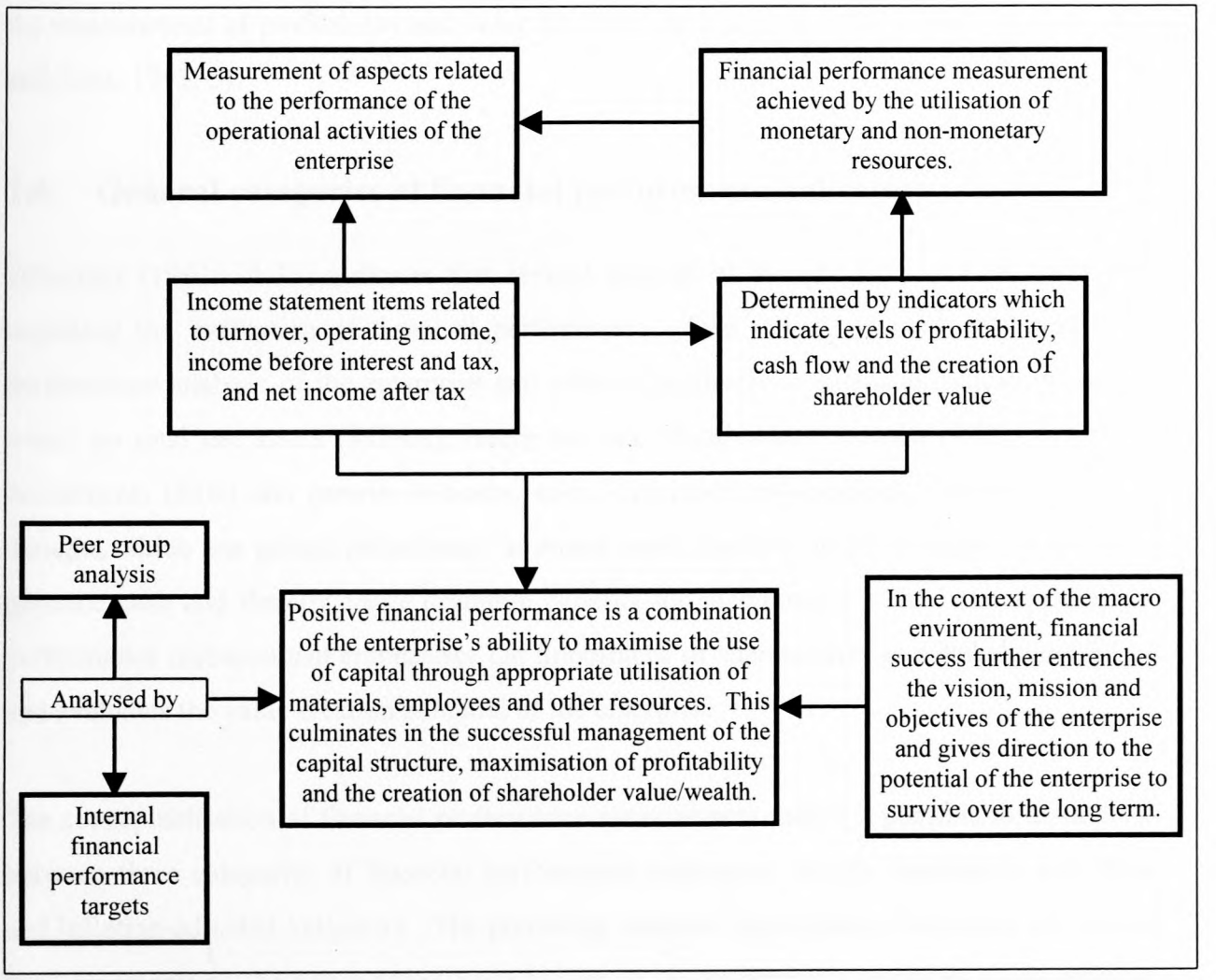


Figure 2.1: A representation of the relationship between the operational activities, financial performance and long-term survival of an enterprise (**Source**: Adapted from Ernst and Ross, 1993)

Figure 2.1 highlights the need to integrate the measurement of the operational activities of the enterprise with the ability of decision-makers to adequately manage capital and other resources. The financial performance analysis is conducted as a combination of the performance of the operational activities and the utilisation and application of financial and other resources available to the enterprise. Once acceptable and relevant financial performance indicators are determined, it is necessary to broaden the scope of the analysis to include comparisons of peer groups and internal financial performance targets. In addition, the measurement process should analyse the effect of external environmental factors (e.g. phases of the economic cycle) on the financial performance of the enterprise and ultimately its long-term survival. The indicator(s) selected to evaluate financial performance should be a combination of operational and strategic financial performance criteria, which aim to enhance the measurement of profitability and value for both the enterprise and its shareholders (Ernst and Ross, 1993: 5).

2.4 General categories of financial performance indicators

Schneider (1992: 34-35) indicates that several schools of thought have evolved over time regarding the evaluation of financial performance. One school relates to the traditional performance analysis of the enterprise and refers specifically to financial indicators such as return on total net assets (RONA), return on total shareholders' interest (ROE), return on investments (ROI) and growth in assets, sales, dividends and earnings. Another school of thought, which has gained prominence in recent years, focuses on the enterprise's ability to generate cash and thereby create desirable benefits for shareholders. The latter approach to performance measurement emphasises the importance of shareholders as a stakeholder group and evaluates the value creation potential of the enterprise.

The conceptualisation of financial performance measurement makes it possible to distinguish between three categories of financial performance indicators, namely traditional, cash flow and inflation-adjusted indicators. The preceding financial performance indicators are further used to determine the value-added contribution of the enterprise's activities to shareholder wealth. Figure 2.2 indicates financial performance evaluation criteria related to traditional, cash flow and inflation-adjusted financial indicators.

Traditional financial performance indicators analyse profitability and growth, and evaluate various specific aspects of financial performance, which include the solvency, liquidity and productivity performance of an enterprise. Cash flow performance indicators are used to evaluate the flow of cash in a given financial year. The cash flow indicators are evaluated in terms of various income statement and balance sheet figures as well as other information relevant for determining the cash flow position of the enterprise. The cash flow of an enterprise therefore reflects inflow and outflow changes of various figures (e.g. working capital) in the financial statements. Cash flow from operating activities forms the basis for the calculation of various cash flow ratios, which measure efficiency and financial performance, and relates to the ability of the enterprise to generate and maintain positive cash flow.

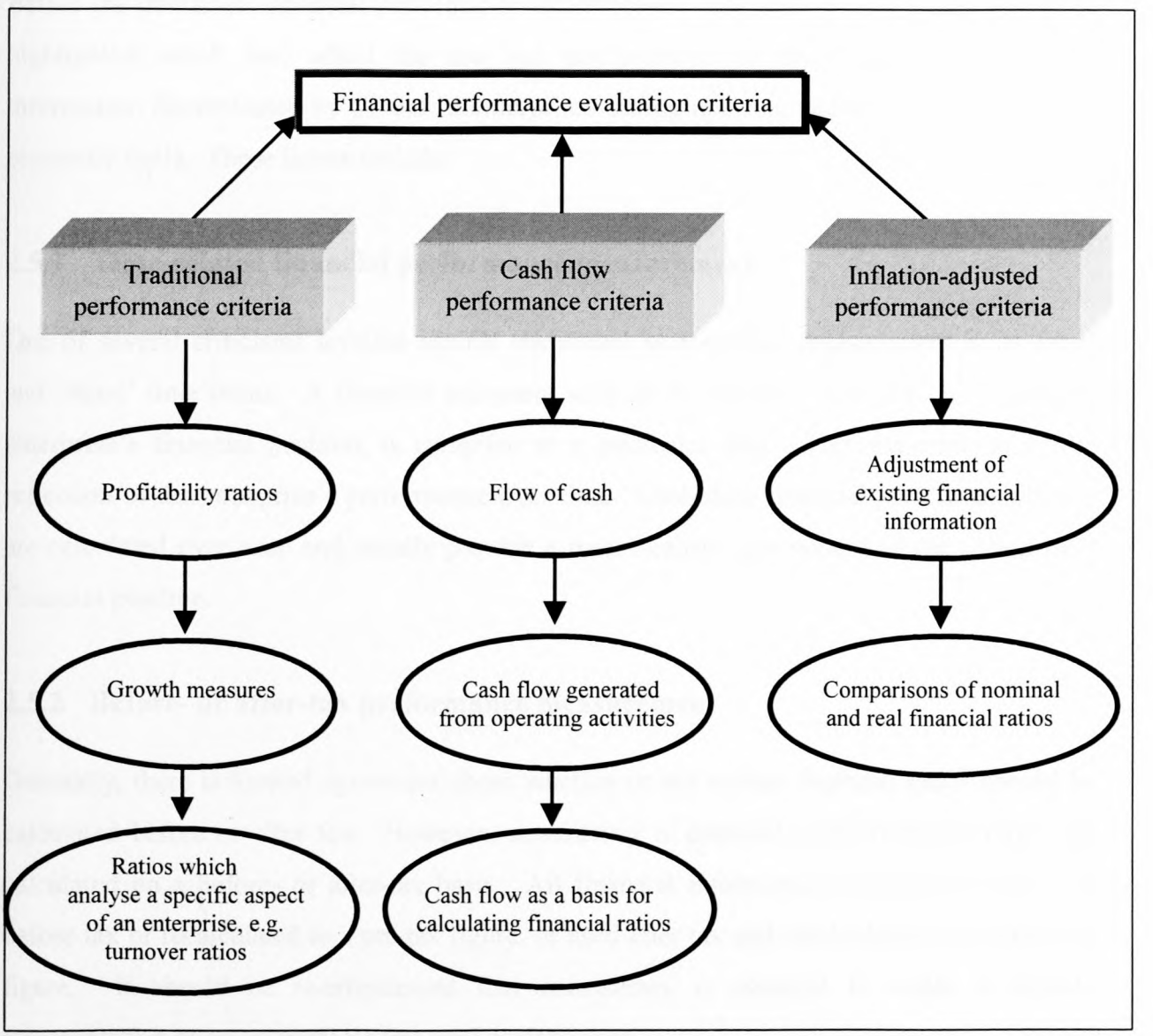


Figure 2.2: Categories of criteria used to evaluate financial performance (**Source**: Adapted from Schneider, 1992: 34-35)

The inflation-adjusted financial performance indicators are a category of ratios that reflect the real financial performance of the enterprise after provision is made for inflation. Several adjustments are made to existing financial statement information which enables the re-calculation of various traditional performance indicators. An inflation adjustment makes it possible to compare the ratios both in monetary (nominal) and real terms. Both the traditional and cash flow evaluation criteria are used to determine an additional group of financial indicators, which reflect the capacity of the enterprise to add value to its business activities and maximise the wealth of shareholders.

2.5 Issues related to financial performance measurement

Before the traditional financial performance indicators are analysed, several issues should be highlighted which may affect the use and interpretation of the financial performance information disseminated by CI and LI enterprises during upswing and decline phases of the economic cycle. These issues include:

2.5.1 Time-related financial performance measurement

One of several criticisms levelled against traditional performance measurement is its focus and 'static' time frame. A financial statement such as the balance sheet, which reflects the enterprise's financial position, is compiled at a particular date. This may not be a true reflection of the enterprise's performance over time. Cash flow financial performance ratios are calculated over time and usually provide a more realistic assessment of the enterprise's financial position.

2.5.2 Before- or after-tax performance measurement

Generally, there is limited agreement about whether or not certain financial ratios should be calculated before or after tax. However, consistency is essential when financial ratios are calculated on a before- or after-tax basis. All financial information should either be used before tax or recalculated to a pre-tax figure, or used after tax and recalculated to an after-tax figure. It should be re-emphasised that consistency is essential to create a reliable representation of an enterprise's financial performance.

2.5.3 Inflation and financial performance measurement

Although inflation is mentioned as a performance measurement criterion in section 2.4, the need to adapt, apply and report inflation-adjusted figures for purposes of financial performance measurement is considered in this section.

Inflation affects financial performance measurement from two perspectives. Firstly, inflation affects certain figures in the financial statements such as the replacement and/or expansion of land and buildings, equipment and vehicles as well as stock and debtors. Secondly, the manner of reporting financial performance refers to whether or not a financial indicator should be expressed in monetary or real (monetary less inflation) terms. Pringle and Harris (1987: 232-235) indicate the following inflation-related distortions that occur in the income statement:

- An increase in prices of items held in inventory tends to overstate the true earnings.
- Depreciation is based on historical rather than replacement cost, thus overstating earnings.
- Taxes paid are not a true reflection of the earned income.
- Interest payable on debt capital usually includes an inflation premium, which again understates earnings.

In economies where inflation is relatively high, failure to revalue assets could create a misleading impression of the enterprise's current financial position. Preferably, assets should be expressed at replacement cost and not historical cost. This requires a revaluation of fixed assets and an adjustment for depreciation. Pringle and Harris (1987: 235) highlight this issue as part of the distortion created by inflation of certain items in the balance sheet. A further limitation is the method of inventory valuation. The impact of inflation on the LIFO method causes stock to be undervalued, while the FIFO method provides a more realistic value of stock. Therefore, over time an under- or over-valuation distorts the actual return for the enterprise. In this instance it is necessary to adjust cost of sales for the effects of inflation.

The gearing adjustment is based on the reclassification of all the liabilities and assets of the enterprise as either monetary or non-monetary. The current cost adjustment, which

encompasses both the depreciation and cost of sales adjustment is used to adapt the ratio of net monetary assets to all other liabilities (Lambrechts in Du Plessis, 1997: 264-265). A true reflection of an enterprise's financial performance is the real return achieved on its productive assets and utilisation of equity and debt capital. Thus, financial ratios such as RONA and ROE should preferably be expressed in real terms. These ratios reflect the overall profitability of the enterprise and return on shareholder capital.

Brown (1995: 157) emphasises the fact that criticism is levelled against the AC201 guideline, which is based on the subjective and technical nature of the three inflation adjustments. The guideline is not often used in practice and apparently does not conform to the needs of users. Furthermore, the potential effects of inflation on the financial results of the enterprise highlight management's unwillingness to publicly display inflation-adjusted figures, primarily due to the potential effect on shareholder confidence and investment opportunities (Brown, 1995: 439-440). In addition, a survey among compilers of financial statements suggests that generally quoted indicators of performance, i.e. earnings, earnings per share (EPS) and dividend per share (DPS), should be deflated in order to express the indicators in real terms (Brown, 1995: 156).

Many of the ratios indicated in Figure 2.3 could be adjusted for inflation. Although inflation-adjusted financial ratios could represent a separate category of performance indicators, they are deduced from traditional performance measures. All the ratios, which form part of the profitability and growth category, could be recalculated from an amended income statement that is compiled using the AC201 accounting guideline. In the same manner several balance sheet figures such as fixed assets are also adjusted for inflation. The indicators marked by an asterisk (*) in Figure 2.3 are adjusted for inflation by using the AC201 inflation accounting principles and are further analysed in Chapters 7 and 8. A complete discussion of, and application to, the financial statements of the inflation adjustment (AC201) guideline is provided by Lambrechts (in Du Plessis, 1997: 259-273).

2.5.4 Use of average financial information

Any enterprise experiences variations in its asset or capital base. In this context, it is useful to overcome the problem of a large acquisition or sale of assets by using averages, which to

some degree would provide a more reliable and more stable figure for large asset or capital structure items over a long-term evaluation of an enterprise's performance. For instance, a five-year average return on total capital considered together with the variance or some other measure of dispersion would provide an appropriate figure over the financial period.

2.6 The traditional approach to financial performance measurement

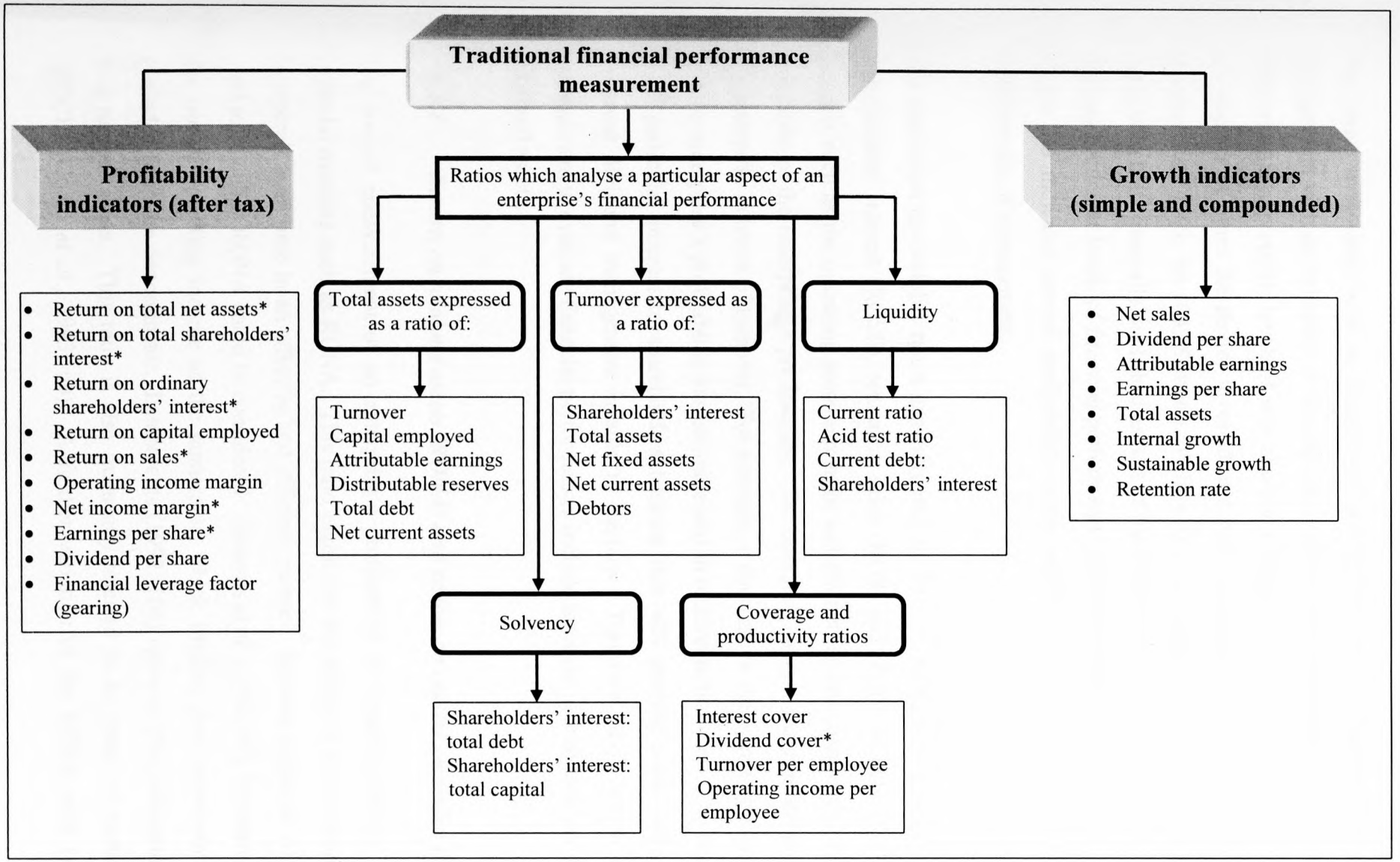
A wealth of literature exists in support of traditional financial performance measurement. Many of the traditional indicators are well documented and analysed in the financial literature. A cross-section of several studies including Boyd, 1991; Chaganti and Damanpour, 1991; Parker and Hartley, 1991; Hamilton and Shergill, 1992; Mahajan, Sharma and Netemeyer, 1992; Ernst and Ross, 1993; Goold, Campbell and Luchs, 1993 and Opler and Titman, 1994, provides a comprehensive overview of financial indicators which are generally used to analyse financial performance. A study undertaken in South Africa by Fasol and Firer (1995: 75) indicates that ROA (all assets) and EPS are found to be the most widely applied financial performance indicators, followed by return on total net assets (RONA) and ROE. Observe that ROI is also often used synonymously with the ROA in different financial texts.

Conformity regarding an acceptable categorisation of the large number of traditional financial ratios used to analyse and evaluate the current and long-term financial performance of the enterprise is limited. Various authors propose several types, but generally similar classifications of financial ratios. Brummer and Rademeyer (1982: 234-235) suggest three categories of traditional financial ratios, which include balance sheet, profitability and sundry ratios. Both Reynders, Lambrechts and Scheurkogel (1987: 115-168) and Lambrechts (1992: 96-123) recommend the use of profitability, liquidity, turnover rate and period, solvency and coverage ratios as a classification of traditional financial performance ratios. In addition, Court and Radloff (1990) use factor analysis (a statistical technique) to determine appropriate categories for financial performance indicators. The first factor, profitability, declares 37% of the variance declared by the total number of ratios included in the analysis; factor two, leverage 26%; factor three, activity 11%; and factor four, flow of funds 8%. Furthermore, Le Roux and Olivier (1992: 57) suggest that financial ratios could be broadly classified as:

- Addressing the same section of financial statements,

- Having the same denominator or numerator, and
- Addressing a comparable subject such as profitability.

Figure 2.3 is a representation of the categories and individual indicators which may be considered when evaluating traditional financial performance. For the purpose of this study, traditional financial performance measures are grouped according to traditional profitability, growth and several other categories that measure a particular aspect of the enterprise's financial position. These categories of financial performance indicators refer to total assets, turnover, liquidity, solvency and productivity indicators, which reflect the employee contribution to the enterprise's financial performance. The profitability and growth categories of traditional financial ratios are discussed and analysed in the context of the contribution to the measurement of an enterprise's financial performance. Reference is also made to several other categories and individual ratios generally used for an analysis of financial performance.



* Ratios adjusted for inflation

Figure 2.3: An overview of traditional financial performance indicators available to analyse financial performance (**Sources**: Boyd, 1991; Chaganti and Damanpour, 1991; Parker and Hartley, 1991; Hamilton and Shergill, 1992; Mahajan *et al.*, 1992; Ernst and Ross, 1993; Goold *et al.*, 1993; Opler and Titman, 1994)

2.6.1 Profitability indicators

The ratios associated with an analysis of profitability in an enterprise usually provide management with an indication of the efficiency and effective utilisation of capital resources. This refers to appropriate levels of several income margins and turnover ratios, which indicate the number of times the money invested in a particular asset becomes available per annum (Lambrechts, 1992: 86-108; Samuels, Wilkes and Brayshaw, 1990: 49). Three additional ratios which are generally published as part of the financial results of an enterprise and which indicate particular levels of financial performance are EPS, DPS and price earnings ratio (PE). Figure 2.3 indicates several profitability ratios, which are useful indicators to assess the effectiveness of management.

The traditional profitability ratios generally include RONA, ROE, ROCE, return on ordinary shareholders' interest (ROSE), return on sales (ROS) and return on debt (ROD). Income margins such as the operating income margin and the net income margin also provide some indication of the enterprise's profitability. The operating margin analyses the profitability of the enterprise in terms of turnover. For example, a decrease in the operating margin indicates that the enterprise's profitability has not increased in relation to turnover. The income margin is of particular interest to shareholders because this will provide some indication of the expected dividend management is able to declare. Turnover ratios, which could assist management to evaluate financial performance, include turnover to total assets and turnover to net fixed assets.

2.6.1.1 Return on total net assets (RONA) and return on capital employed (ROCE)

The overall measurement of an enterprise's profitability is usually analysed by using a financial measure such as RONA. This ratio highlights the ability of the enterprise to utilise its overall asset base in an effective and efficient manner. Several variations of the formula used to calculate RONA could be considered. Samuels *et al.* (1990: 49), for example, propose the use of operating income as the numerator, which implies that investments should be excluded from the denominator. Lambrechts (1992: 108) refers to this calculation of RONA in a narrow sense. This ratio is also frequently referred to as return on capital employed (ROCE) (Goold *et al.*, 1993: 60). A further variation of the RONA ratio is to subtract

intangible assets from the total assets figure. Intangible assets are usually deducted because no contribution is made to the actual operating activities of the enterprise.

Return on total net assets (Ernst and Ross, 1993; Boyd, 1991) is also often used in the literature as a return ratio, which implies the same as ROCE (Parker and Hartley, 1991; Goold *et al.*, 1993). However, the literature clearly suggests some hesitation regarding the use of book ROI as a measure for evaluating financial performance (Brealey and Myers, 1988: 251). This view is supported by Ernst and Ross (1993), who further refer to the impact of growth on the short and long-term use of this indicator to analyse performance. The major concern with ROI as a performance indicator in the short term is its potential to under- or over-state returns, which could only be overcome if the growth in investment increases at the same rate as the real return.

2.6.1.2 Return on total shareholders' interest (ROE)

The ROE ratio is often highlighted due to its interest to shareholders. It provides shareholders with an indication of the use of their funds by management and determines how well the enterprise succeeds in achieving an acceptable return based on net worth. However, ROE together with other relevant financial performance ratios cannot be seen in isolation, but should be analysed in the context of the enterprise's policy of using debt to finance activities. This effect is generally referred to as financial leverage and indicates the effective use of debt capital and the consequences for potentially eroding shareholder returns. The leverage factor as a measure of financial performance is used to analyse the association between ROE and RONA. A ratio of larger than one suggests a positive leverage and a value of smaller than one a negative leverage (Lambrechts, 1992: 110-111).

Fruhan (1979: 35) further suggests that ROE could also be adjusted for advertising and research and development (R&D) expenditure in accordance with generally accepted accounting principles. The premise for the ROE adjustment is based on the practice that expenditures of this nature are often written off as expenditure items immediately under Generally Accepted Accounting Practice (GAAP). These expenditures should be considered as economic assets and "capitalised" in the balance sheet. The subsequent effect would be an increase in the net worth (total shareholders' interest). However, if the annual growth in

advertising and R&D expenditure were not sustained by a corresponding increase in profits, an enterprise's ROE would be reduced. It is therefore essential to determine a realistic and reasonable economic life for advertising or R&D expenditure if an approach is adopted to capitalise these types of expenditures.

2.6.1.3 Additional measures of return on capital

Two additional measures of return based on capital and investment are the return on debt (ROD) and return on ordinary shareholders' interest (ROSE). Each ratio is of interest to a particular stakeholder group, over and above the contribution of the ratios to an analysis of the overall profitability of the enterprise's financial performance.

The ROD determines an average interest rate (cost of debt) for the enterprise to average debt capital. The objective for an enterprise is to keep this ratio as low as possible when relating the debt situation to the equity capital of the enterprise.

Return on ordinary shareholders' interest (ROSE) reflects the return on paid-up capital and is of particular interest to ordinary shareholders' who are the largest contributors of equity capital to the enterprise. As with all traditional performance measures, there is scepticism about the manner in which the ratio is analysed and its usefulness as a measure of financial performance.

2.6.1.4 Operating income margin

All income margins are expressed as a percentage of turnover, whether it be the gross income margin, net income margin or the operating income margin. The latter together with the RONA and ROE are believed to be the most widely used measures to analyse profitability (Ross *et al.*, 1993: 69).

The operating income margin stresses the need for an enterprise to continually review its operating costs. A low ratio would indicate that the enterprise has excessive operating expenditure relative to turnover, which necessitates an analysis of the total expenditure and individual expenditure items in relation to sales. Gordon (1992: 70) notes that this ratio reveals the net income generated by each net Rand of sales. The effect of a lower selling price

and increasing volumes should not cause a decline in the operating income margin, but large-scale changes could not be considered provided volumes increase.

2.6.1.5 Earnings per share (EPS) and dividend per share (DPS)

The EPS and DPS are financial measures generally quoted by enterprises as an indication of profitable financial performance. An EPS ratio informs ordinary shareholders of the amount of earnings the enterprise generates per ordinary share. Although enterprises use EPS to highlight performance, it is not considered in the literature as a key financial performance indicator, but is generally used in financial reporting as a reflection of financial performance. Comparisons of EPS among enterprises are also difficult due to the changes in the number of issued shares caused by, for instance, a rights issue, which could actually dilute the EPS and create a false impression among shareholders. This problem is addressed by using an average number of issued shares or a weighted average number of ordinary shares. Currently, companies are compelled to use a weighted average number of shares when calculating, for instance, EPS or DPS.

The financial literature indicates potential problems with the use and interpretation of EPS (Stern, 1977: 29-40; Stickney, 1990: 218-219). The criticism against EPS is further highlighted in statements made by Stern (1977):

"Any valuation of corporate policy in terms of earning per share is fraught with danger."

" ....EPS not only misdirects management in selecting and pricing acquisitions, it also leads to ridiculous conclusions about the portions of debt and equity in a company's financial structure."

Stickney (1990: 218) endorses the statements made by Stern, suggesting that as an indicator of profitability, EPS does not consider the amount of assets or capital required to generate a level of earnings. Furthermore, EPS has several shortcomings as a measure of corporate strategy (Rappaport, 1981):

- There are several ways to measure EPS. For example, depreciation can be measured using a variety of approaches.

- Earnings figures do not adequately reflect risk. Relevant risk is determined by both the enterprise's investments as well as by the financing decisions made to support these investments.
- Earnings do not take into account working capital and fixed investments needed to anticipate sales growth.
- Projected earnings ignore potential changes in an enterprise's cost of capital due to inflation and shifts in business and financial risk.
- The EPS approach to strategy ignores the importance of dividend policy. If an enterprise did not pay dividends, but retained earnings while investing shareholder funds at rates below the minimum acceptable market rate, the value of the enterprise would decrease.

These shortcomings do not imply that growth in EPS as a measure of performance is not important. Clarke, Wilson, Daines and Nadauld (1988: 12) contend that EPS is only part of the picture. The market's assessment of management talent, profitable investment opportunities and competitive risk is captured in the enterprise's PE multiple. Increases in shareholder value occur as a result of the interaction between both EPS and PE, not just increases in EPS.

Enterprises are not compelled to pay dividends, but generally declare dividends in order to enhance their image and give potential investors some idea of the dividend policy and growth over time. This phenomenon is apparent in the analysis of DPS in Chapters 7 and 8. The DPS may be of more value to current and prospective shareholders if reviewed over a number of years.

2.6.2 Turnover indicators

The operating financial performance of both CI and LI enterprises is primarily determined by the overall income from sales and the manner in which assets are utilised to generate sales. Financial performance indicators, which could provide a perspective on the utilisation of assets by the enterprise, are the turnover ratio of net current assets and the turnover ratio of net fixed assets.

2.6.2.1 Turnover to net current assets

The short-term position of the enterprise could be analysed by a ratio such as turnover to net current assets (current assets minus current liabilities). This illustrates the extent to which the net current assets have been utilised effectively to generate sales. A low turnover to net current assets ratio, which could negatively affect profitability, may indicate an over-investment in current assets or an under-utilisation of current liabilities. In addition, the enterprise may need to analyse financial ratios such as the stock turnover rate and debtors' payment period to identify possible symptoms of over investment in current assets. If both the aforementioned ratios have high figures, the effect on profitability should be positive, which further indicates that the components of current assets are being well managed.

2.6.2.2 Turnover to net fixed assets

The productive means of the enterprise are also analysed by the turnover to net fixed assets. It should be noted that only fixed assets, which are used productively, should be included in the calculation of the ratio. A low ratio may indicate that the enterprise faces financial problems if an excessive investment in fixed assets is made. However, a high ratio suggests that the enterprise is effectively utilising its assets, provided that sales growth is sufficient to maintain the high utilisation of fixed assets. In addition, technological innovation could further enhance the enterprise's ability to achieve a high turnover rate and make a larger contribution to profitability.

The Du Pont analysis stresses the effect of operating efficiency, asset use efficiency and financial leverage by analysing the turnover to fixed and current assets, the net income margin and financial leverage (equity to debt) (Ross *et al.*, 1993: 74). As mentioned before, the ratios used to analyse profitability are not independent, but relate to one another as indicated by the Du Pont analysis.

2.6.3 Growth rates as indicators of financial performance

Growth rates measure the performance of the enterprise over a specified number of years. It is an analysis of past performance, but managers need to analyse growth rates of critical financial magnitudes in order to identify and obtain insight into financial trends and

fluctuations that occurred over the past number of years. Many financial determinants may affect the future growth of the enterprise, in particular operating activities and the manner in which the financial statements are analysed. A review of key growth rates could also provide information on trends, performance gaps and may have implications for various strategic business options which the enterprise may contemplate in the future. Growth rates are often associated with shareholder returns and arguably many surveys, which analyse financial success and performance, use growth or returns as measures of performance.

Before analysing the growth rate of several financial magnitudes, it is necessary to briefly review options available to management for calculating growth. The growth rate of a particular financial magnitude either represents simple or compounded growth or can be calculated in monetary (nominal) or real terms. Simple growth rates are not used as frequently as compounded growth to evaluate financial performance. Average compounded growth, which invariably represents a percentage increase, is often used to reflect and analyse the extent of an improvement in the performance of an enterprise.

A decision should be taken whether or not to measure and analyse growth in monetary or real terms. In an economy with high inflation rates nominal growth in sales or assets, for example, could easily distort the actual financial performance of the enterprise and may give the impression of a satisfactory financial position. It is suggested that all financial figures such as assets, turnover and net worth, which are particularly prone to inflation, should be analysed in real terms over an extended financial period. A long-term analysis of growth rates over a five to ten year period could significantly eliminate distortions caused by short-term fluctuations in an enterprise's financial performance.

Peters and Waterman (1982) in their well-known work *In Search of Excellence* use six financial indicators to analyse "long-term" superior performance over a period of twenty years for a host of enterprises. Besides using the traditional indicators of RONA, ROE, ROS and the measure of market to book value per share, they also included two growth indicators, compounded asset growth and compounded equity growth. Hamilton and Shergill (1992: 102) propose the use of several other growth measures in addition to those proposed by Peters and Waterman, i.e. growth in total net assets, EPS, DPS and sales.

It is further possible to supplement the list of growth indicators by adding growth in earnings and cash flow. Figure 2.3 highlights several growth indicators which are useful for analysing financial performance. Before analysing the growth of specific financial figures, the internal growth rate and sustainable growth rate of the enterprise are analysed. These indicators could be considered as pointers for the usage of more debt capital by management.

2.6.3.1 Internal growth rate

The internal growth rate is defined as the maximum growth rate that could be achieved with no external financing of any kind (Ross *et al.*, 1993: 106). In other words, the enterprise can maintain a growth rate in assets with internal financing only. The RONA is primarily the focus of internal growth (Ross *et al.*, 1993: 106). The internal growth rate is measured by the formula $\frac{ROA \times B}{1-(ROA \times B)}$ where (B) represents the retention rate (see footnote 1.1 at the end of Chapter 2). When calculating internal growth it is important to be consistent and use either before- or after-tax figures. For example, an internal growth rate of 10% implies that the enterprise has the financial resources to accommodate growth in assets at a rate of 10% per annum without the need for any additional external finance. Alternatively, this growth rate indicates that internally generated funds are sufficient to finance growth of 10% in assets.

2.6.3.2 Sustainable growth rate

The sustainable growth rate is the maximum growth an enterprise can maintain without increasing its financial leverage (Ross *et al.*, 1993: 107). The primary difference between the internal and sustainable growth rate is based on the use of internal funds (retained earnings) and external funds (such as equity and debt capital). In contrast to the use of RONA to calculate the internal growth rate, the sustainable growth rate is based on ROE.

This measure indicates the maximum growth rate an enterprise can achieve without the additional use of equity capital, while still maintaining a constant debt to equity ratio (Brigham and Capenski, 1991: 934). Several determinants, which directly affect the sustainable growth rate, include (Ross *et al.*, 1993: 109):

- Operating efficiency measured by the income margin
- Efficient use of assets measured by total asset to turnover ratio

- Dividend policy measured by the retention ratio
- Financial policy measured by debt to equity ratio.

Sustainable growth rate (g) is expressed in terms of the following equation (Lambrechts, 1992: 571):

$$g = RONA(B) + \frac{BVD}{BVE}(RONA - ROD)B$$

where BVD represents book value of debt; B indicates the retention rate and BVE refers to book value of equity.

The following formula forms the premise for calculating the sustainable growth rate proposed by Ross *et al.* (1993) and is expressed as: $g = \frac{PM(S)B}{A - PM(S)B}$. Through mathematical manipulation it is possible to adapt the preceding formula and express the sustainable growth rate as $\frac{ROE \times B}{[(1 - (ROE \times B)]}$ (Ross *et al.*, 1993: 110) (see footnote 1.2 at the end of Chapter 2). A sustainable growth rate of 18% indicates the ability of the enterprise to expand its asset base by another 18% per annum before external finance is needed.

A similar format to the sustainable growth formula suggested by Ross *et al.* (1993) is provided by Clarke *et al.* (1988: 26), who express sustainable growth as follows: $g = \frac{PM(1-p)(1+DER)}{ASR - PM(1-p)(1+DER)}$. The (1–p) in the formula could be replaced by (B) which is the retention rate as referred to above, while ASR refers to a capital intensity indicator, which in this case is taken as assets divided by sales. DER refers to the debt to equity ratio and PM to the after tax income margin.

The following hypothetical information is used to calculate the sustainable growth rates for each of the formulae proposed by Lambrechts (1992), Ross *et al.* (1993) and Clarke *et al.* (1988). In this manner it would be possible compare the indicators:

RONA = 10%
ROE = 12%
ROD = 6%
Debt/equity ratio = 0,5

Profit margin (PM) = 8%
Retention rate (B) = 40%
Capital intensity indicator (assets to sales) = 1,8

	Sustainable growth rate (g)	**Internal growth rate**
Clarke et al. (1988)	3,3%	
Lambrechts (1992)	4,8%	
Ross et al. (1993)	5,0%	4,2%
Average (g)	**4,4%**	

The formulae used to calculate the growth rates do not differ significantly from one another. All the information provided above is used either in the actual formulae or as part of the mathematical deduction process to obtain the formula. A primary difference between Ross *et al.* (1993) and Lambrechts (1992) is the use of RONA and ROE, although the actual results from the calculation of the growth rates differ only slightly. The sustainable growth rates calculated above do not deviate significantly from one another. An average of 4,4% is obtained for the three indicators. In terms of selecting an appropriate formula for assessing the sustainable growth rate, it would be possible to use any one of the three, while Ross *et al.* (1993) is probably the most simplified indicator in terms of the information needed to calculate the sustainable growth rate. The internal growth rate indicated in section 2.6.4.1 should be used in conjunction with the sustainable growth rate to determine the possibility of using internal funds or rely on external sources of funding.

The sustainable growth rate provides the enterprise with an indicator of growth potential, but as with all other relevant financial growth indicators, it should also be analysed in real terms. This is necessary because the assets utilised to generate growth often require revaluation due to inflation and this would over-estimate the sustainable growth rate. Higgins (1977: 7 and 1981: 36), who initially formulated the concept of sustainable growth, suggests that, despite the controversy about the impact of inflation on sustainable rates of growth, subtracting the rate of inflation from the nominal figure could approximate an enterprise's real sustainable rate of growth. Moore (1988: 49) endorses the effects of inflation on the sustainable growth equation, which ultimately reduces the real sustainable growth potential of the enterprise.

Furthermore, Moore (1988) warns that growth has been second only to profits, both as a goal and as a measure of financial success. However, if sales expand at a rate greater than can be supported by the debt to equity ratio, an increase in debt financing or a higher retention rate is required.

2.6.3.3 Growth rates of individual financial magnitudes

Generally, reference is made to the growth of several financial magnitudes such as assets, equity and earnings. It is, however, important to analyse growth rate fluctuations over an extended period of time, which may indicate either an above-average or below-average financial performance. However, it is possible that growth over an extended period of time may indicate irregular and sometimes inconsistent patterns of financial performance. This distorts the actual growth trend and therefore some form of transformation such as a log transformation is required which would bring the values closer together and reduce large irregular fluctuation in the growth measure over an extended financial period. However, should comparisons between variables be required, a normal standardisation procedure would be useful to enable comparisons of variables at the same scale. A possible alternative is to use an average annual compounded growth rate to reflect the performance of a particular financial indicator over a period of five years.

Additional possibilities for determining growth over a period of time involve calculating a percentage change in the variable after applying a smoothing constant to each growth variable. A second option is to fit an ordinary least squares method to the variable. In the first instance the annual percentage change in the financial variable over several years is determined and an average of the percentage changes is calculated to provide a standardised average growth rate over the period of analysis. The second method suggests fitting an ordinary least squares regression to the time series over the period of the analysis. This approach would provide an average growth rate over time (Hamilton and Shergill, 1992: 103).

The growth in net sales is discussed as a primary measure of growth in the following section. Several of the other growth measures indicated in Figure 2.3 are closely related to net sales. The growth in net sales directly affects the growth in assets and the internal growth rate, which in turn is affected by the growth in earnings and retained earnings. Brigham and

Capenski (1991: 932) highlight the following relationships between growth in sales, assets and the retention rate:

- An increase in sales normally requires an increase in assets.
- Any anticipated growth in assets requires some form of financing. The earnings of the enterprise and therefore the retention rate affect this in turn.
- If the internal growth rate is low, spontaneously generated funds plus retained earnings may be sufficient to finance growth. If growth is anticipated, external funds may be needed which in turn affects the feasibility of the enterprise's expansion plans. The sustainable growth rate would then have to be considered because the EPS and DPS could be adversely affected by the expansion plans, especially if the anticipated growth in sales does not materialise.

Both CI and LI enterprises should not rely on one growth measure to gauge its relative growth performance, but should look at a composite index of several measures and analyse the effect of individual growth measures on the index. As indicated previously, it is essential for the enterprise to analyse its growth performance in terms of inflation-adjusted figures. As a consequence of inflation the benefit of every Rand generated through sales is reduced by an amount corresponding to the current inflation rate. Figure 2.4 is an indication of average nominal inflation rates for the period of the financial performance analysis (1987-1992) (Bureau for Economic Research, 1995: 38). The analysis conducted in Chapters 7 and 8 are based on the time frame specified in Figure 2.4.

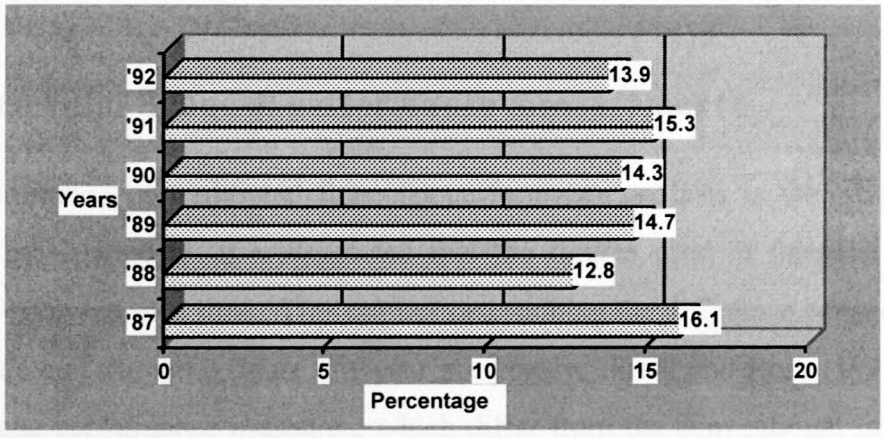


Figure 2.4: Average inflation rates as measured by the CPI for 1987 to 1992 (**Source**: Bureau for Economic Research, 1995: 38)

It is clear from Figure 2.4 that double-digit inflation is reported over the period selected for the analysis. The average inflation rate as measured by the Consumer Price Index (CPI) for the period of the research is 14,5%, which is relatively high if comparisons are made between growth rates based on monetary and real values (Bureau for Economic Research, 1995: 38). For example, an average inflation rate of 15,3% for 1991 and growth in enterprise sales of 20%, actually implies a real growth rate of 4,1%, which could be unacceptable to potential and current stakeholders (Lambrechts, 1992: 533) (see footnote 2 at the end of Chapter 2).

2.6.4 Additional traditional indicators of financial performance

Several traditional measures, which do not form part of the profitability or growth categories of financial performance indicators, address a particular aspect of the enterprise's financial position. These indicators analyse total assets, turnover, solvency, liquidity, coverage and productivity performance. In addition to the turnover indicators highlighted in section 2.6.3, several other turnover ratios are also highlighted. The manner in which total assets are utilised is expressed by a relationship with several other financial magnitudes.

Apart from the interpretation of the financial ratios in the text, the meaning and explanation of all the ratios which appear in Figure 2.3 are discussed and analysed by various authors, including McDonald and Smith, 1995; Hamilton and Shergill, 1992; Mahajan *et al.*, 1992; McCrory and Gertsberger, 1992; Lee and Cooperman, 1989 and Vasconcellos e Sa, 1988. It should be stressed that many of these measures complement and supplement one another and cognisance should be taken not to isolate any one ratio as the only criterion to measure financial performance.

2.7 Incremental financial performance measurement

One major limitation of traditional financial performance analysis is the 'static' nature of performance measurement. It is suggested that the figures used in financial performance evaluation be analysed over time. This implies determining the difference between the current financial figure and the same figure one year previously. Ernst and Ross (1993: 7) propose several financial performance indicators, which differ from the conventional financial ratios, but should be seen as measures, which provide practical value for day-to-day managers. These ratios are based on the premise of determining the long-term effects of current actions.

The following ratios are provided as examples of dynamic financial performance measures:

Research and development (R&D) is calculated as:

$$\frac{\text{R\&D expense (current)}}{\text{invested capital (current)} - \text{invested capital (previous year)}}$$

Process innovation is calculated as:

$$\frac{\text{Property, plant and production equipment} - \text{capital expenditure (current)}}{\text{net sales (current)} - \text{net sales (previous year)}}$$

Ernst and Ross (1993: 10) believe "both time and perspective matter [in financial performance measurement] and that managerial vision needs to expand from its traditional 'static' orientation to dynamic perceptions of balance among forces in motion towards goals". In addition, an incremental approach offers a practical means of achieving more dynamic financial performance management in an enterprise.

2.8 A critical evaluation of traditional performance indicators

The objective of this section is to conduct a critical review of traditional performance measurement in order to identify several ratios, which are considered useful for analysing the behaviour of financial performance indicators for CI and LI enterprises during an upswing and decline phase of the economic cycle. The process commences with a review of relevant literature and research conducted by authors who use traditional performance indictors to measure the consequences of strategic decisions. The following part of the analysis involves an application of qualitative criteria to various selected traditional performance indicators. This procedure involves an initial pre-sifting process to eliminate ratios that do not conform to several general evaluation criteria. Those indicators that remain after the initial selection stage are subjected to specific qualitative evaluation criteria and are assigned a "score" in order to quantify the process of selecting the "most" appropriate indicators. Furthermore, the limitations of the process are highlighted. Finally, several critical pointers related to the traditional approach are emphasised in order to contextualise the use of traditional performance indicators.

2.8.1 Relative importance of traditional financial performance indicators: Literature review

Traditional financial performance indicators have been used by various authors as measures of general financial performance and to determine the relationship between financial performance and a particular strategic aspect of the enterprise. Table 2.1 shows the popularity of traditional indicators used by various authors for measuring financial performance in descending order. A literature review of research over the seven years preceding 1997, which indicates the period used as a criterion to ensure the relevance of research included in the study, is conducted in order to provide an appropriate indication of useful traditional financial performance indicators. However, many financial performance evaluation studies refer to financial indicators which are considered to be relevant for a particular type of strategic measurement process.

Table 2.1: The use of traditional financial performance indicators in a cross-section of research studies

Financial performance indicator	Literature sources								Total count
	1	2	3	4	5	6	7	8	
ROE		✓	✓	✓		✓	✓	✓	6
RONA		✓	✓	✓		✓	✓		5
ROSE					✓		✓	✓	3
Sales growth		✓		✓	✓				3
ROS			✓			✓			2
ROCE	✓							✓	2
Price earnings				✓			✓		2
Earnings growth			✓	✓					2
Asset growth		✓	✓						2

Sources: Boyd, 1991; Chaganti and Damanpour, 1991; Parker and Hartley, 1991; Hamilton and Shergill, 1992; Mahajan *et al.*, 1992; Ernst and Ross, 1993; Goold *et al.*, 1993; Opler and Titman, 1994

Notes: Several additional ratios not included in the above table, but highlighted in the research studies, include: stock to turnover; debtors to turnover; wages to expenditure; debt to assets; working capital to assets; EBIT to total assets; debt to equity, working capital to sales, earnings per share growth, equity growth, earnings per share and dividend growth. Two of the studies indicate the use of the market to book value indicator. However, this is a value indicator that highlights the value-creation potential of the enterprise and is not included as part of traditional performance measurement indicators, but discussed in Chapter 4.

These ratios are mentioned in only one study out of the selected literature sources and are therefore excluded from the table. To be included in the table, the indicator had to be used at least twice in different studies. In two of the studies ROA and ROI are both used as performance indicators. Generally, these two performance indicators are considered synonymous or measure the same aspect of the enterprise's financial performance. Therefore, ROI is not indicated in the table for the purposes of the analysis of literature sources.

The sources listed above were obtained from an extensive review of the Business Periodicals Index, a world-wide database that consists of titles of all recognised journal articles. In addition, ISAP, which contains journal articles published in South Africa, was also sourced for relevant literature titles. Different combinations of key words are used to highlight the particular reference section in the database. Once a section is selected the titles of the articles are scanned together with key words indicated in the "subjects covered" portion of the particular reference. Those articles which are potentially considered to be relevant to the research are sourced and their information content analysed for use in the text. In addition, several financial texts are also sourced and, where possible, the latest editions are used to complement the journal articles.

Despite the focused nature of the performance measurement in many of these studies, it is assumed that an appropriate cross-section of traditional ratios is provided to measure financial performance. Furthermore, the indicators in these studies are selected in order to maximise the performance measurement potential of an implemented strategy and therefore, in the context of the particular study, may be considered as appropriate indicators of traditional performance measurement. This should enhance the procedure of selecting appropriate performance indicators and the application of suggested evaluation criteria.

Table 2.1 indicates that each author who refer(s) to financial performance indicators shows a preference for certain ratios with regard to their applicability for use in traditional financial performance analysis. It is evident that RONA and ROE are preferred measures of financial performance in several research studies, while ROSE and sales growth are used to a lesser extent (McDonald and Smith, 1995; Ernst and Ross, 1993; Mahajan *et al.*, 1992; Hamilton and Shergill, 1992; Chaganti and Damanpour, 1991 and Boyd, 1991).

Several studies also refer to the use of income margin indicators of financial performance (Lee and Cooperman, 1989). For instance, Bosch and Du Plessis (1994: 10) found in an empirical research project that the income before interest and tax margin, the gross income margin, the operating income margin and the net income margin are often used for the measurement of financial performance by various types of enterprises. Other measures which are used to evaluate financial performance are EPS (Boyd, 1991) and PE (Boyd, 1991 and Chaganti and Damanpour, 1991). Growth rates of particular financial magnitudes such as assets and

turnover are referred to in several studies (Opler and Titman, 1994; Hamilton and Shergill, 1992 and Boyd, 1991).

The above discussion indicates that profitability indicators, supplemented by growth measures, are preferred as traditional performance indicators in the majority of the research studies. The emphasis is placed on ratios that reflect the utilisation of capital and operating efficiency (which is also highlighted by growth in sales). In addition, the ratios mentioned in the note to Table 2.1 could be regarded as specific to a particular measurement application due to their reference in only one of the eight studies highlighted.

2.8.2 Formulation of evaluation criteria for assessing financial performance indicators

Several qualitative selection criteria are formulated in this section in order to conceptualise the use and measurement potential of selected traditional performance indicators. These criteria could also be applied to other categories of financial performance indicators. In order to contextualise the use of the evaluation criteria, it is possible to propose two general criteria as part of a "pre-sifting" process to determine the relevance of traditional financial performance indicators.

- Financial performance indicators which have a *limited scope*, or are specific regarding information content are excluded from further analysis. This implies that the excluded ratios could be used to provide a more in-depth analysis of the financial issues identified by more general financial performance indicators. For instance, if the turnover to total net assets ratio, which in this case is regarded as a general performance indicator, is lower than in previous years, it would be necessary to analyse specific ratios such as turnover to net fixed assets and turnover to net current assets. The latter indicators could be used to enhance the performance measurement process, but are not included due to their specific focus on categories of assets and not total asset utilisation.

- Financial performance indicators which *duplicate* the measurement of a particular aspect of the enterprise's financial position. This situation requires an elimination of indicators which are highly correlated and reduce the effectiveness of financial performance

measurement. This could imply that relevant ratios might be excluded as part of a selection of performance indicators due to the inclusion of two ratios that cause duplication of performance measurement. For instance, it is possible that ratios such as ROCE and RONA measure very similar aspects of the enterprise. The difference between the two indicators refers primarily to the use of capital to finance external financial investment. In this case RONA would be included as a possible performance indicator, due to its more general nature for analysing the utilisation of all assets. The same rationale applies to liquidity ratios such as the current ratio and the acid test ratio.

After applying the above general criteria to various ratios included in Figure 2.3, it is possible to formulate more specific criteria for evaluating the adequacy of traditional financial performance indicators not eliminated during the initial pre-sifting phase. The aim of this stage of the process is to identify those indicators which provide a more general orientation of financial performance measurement and conform to an arbitrary minimum requirement of 50% (five out of a possible ten) for each of the proposed evaluation criteria developed for the purposes of this section and the following chapter. The following qualitative criteria focus on the need for the financial performance indicator:

1. to contribute to, and enhance *positive cash flow*;
2. to be internally consistent by *highlighting* or complementing the *primary goal* of financial management, which is the maximisation of shareholder wealth through the creation of value;
3. to reflect *continuity* in the use of the indicator for financial performance measurement and analysis. The indicator highlights the enterprise's ability to continue functioning despite changes which occur in certain financial items as reflected by the operations of the enterprise;
4. to highlight the ability of the enterprise to maintain overall *financial stability*. The indicator would reflect financial stability despite strategic changes and decisions that have significant financial implications for the enterprise's future performance and competitive position;
5. to *emphasise the efficiency* of the enterprise's business activities over the short and long term and as a consequence enhance management's ability to grow the enterprise;

6. to be *autonomous* as an indicator of financial performance. In other words, the indicator is not regarded as a means to an end, but as an indication of overall financial performance;
7. to highlight the *sufficiency* of the enterprise's financial performance *to meet its obligations* and provide adequately for its financial needs.

Table 2.2 provides an analysis of several traditional performance indicators mentioned in Figure 2.3, which are subjected to a series of qualitative evaluation criteria subsequent to the pre-sifting phase. All the performance indicators are allocated a score for each individual evaluation criterion. The indicators are ranked based on the average score obtained after the application of each evaluation criterion. In order to illustrate the process of scoring and application of each criterion to the performance indicator in Table 2.2, the RONA is used as an example. The same procedure is applied to the other identified performance indicators.

Table 2.2: The scores applicable to a selection of traditional performance indicators after the application of the proposed evaluation criteria

Performance indicator	Criteria							Average Score
	1	2	3	4	5	6	7	
Sustainable growth	9	8	10	10	10	8	10	9,29
ROE	8	10	10	7	9	10	6	8,57
RONA	7	6	10	10	10	10	6	8,43
Turnover to total net assets	8	7	8	10	9	7	5	7,71
Earnings per share growth	5	7	10	7	9	9	7	7,71
Debt to equity ratio	6	7	10	8	6	7	7	7,29
Growth in sales	9	6	7	6	8	7	6	7,00
Growth in assets	8	7	7	6	8	7	6	7,00
ROS	8	6	7	7	7	8	5	6,86
Growth in dividend per share	5	7	9	5	7	8	6	6,71

Note: Each criterion which is applied to the performance indicator is allocated a score out of 10 as indicated in the table above. The performance indicators highlighted in bold also form part of the ratios used in the research literature highlighted in section 2.8.1 to measure traditional performance.

The following "score" classification may be a useful guide to assess the relevance of the indicator in terms of each evaluation criterion: 5-6 Adequate; 7-8 More appropriate; 9-10 Important.

The need to maximise the use of all assets is required in order to enhance the income before interest and tax. This forms the point of departure in cash flow from operating activities and has the potential to enhance positive cash flow, but could differ substantially due to the manner in which income is defined [score 10]. RONA complements and enhances the maximisation of shareholder value. Together with the Weighted Average Cost of Capital (WACC), RONA is used to determine whether or not value is created by the enterprise. It could also be assumed that shareholders would benefit from overall creation of value [score 9].

Return on assets provides continuity in the use of the indicator to determine financial performance. It is a ratio that would highlight the ability of the enterprise to continue functioning despite changes which may occur in other financial items which reflect the short- and longer-term financial position of the enterprise [score 10]. The fourth criterion reflects the ability of the enterprise to maintain stability in its financial position. Return on assets ensures that all assets and investments could be utilised in a manner which would for at least a period of time ensure and guarantee stability in the enterprise's financial position, despite major strategic changes which have significant financial implications for the enterprise [score 10]. As a profitability indicator, RONA emphasises the efficiency of the enterprise's operations by highlighting the income generated by the use of all assets at management's disposal. The internal operations of the enterprise are emphasised when using RONA, while a further indication is obtained of the cost-effective use of all assets [score 9].

It is possible to consider RONA as an autonomous measure of financial performance, which provides an overall indication of the enterprise's operations. This indicator is derived from a combination of the income margin and turnover to total assets ratio [score 10]. As an indicator of sufficiency, RONA provides a limited indication of the enterprise's ability to meet its financial obligations. However, indirectly it highlights the generation of income required to meet obligations which arise from the utilisation of capital resources [score 6].

A comparison between the traditional financial performance indicators highlighted in Table 2.1 and Table 2.2 clearly indicates that RONA (8,42) and ROE (8,57) are preferred as base-line measures of traditional performance measurement. However, it is suggested that sustainable growth (9,28) be included in the performance analysis as an indicator, which scores an average of nine points and therefore, significantly enhances the potential of the indicator to contribute to performance measurement. In addition, the sustainable growth rate, which encompasses growth in sales, also takes several other ratios such as the net profit margin, payout ratio, the debt to equity ratio and the turnover to total net assets ratio into consideration. The latter two performance indicators, which are included in both the results from the literature survey and the criteria-based evaluation, are also included as separate ratios.

In addition, RONA forms an important part of value-creation analysis and is a determinant for analysing sustainable growth. ROCE is also not indicated as a separate performance measure due to minor differences between ROCE and RONA. However, in more specific financial performance measurement, ROCE, which generally excludes intangible assets and/or external financial investments, could be more appropriate. ROE also forms part of value-creation analysis discussed in Chapter 4. In addition, this indicator highlights the overall measurement of owners' equity contribution to the overall profitability of the enterprise. Furthermore, return on ordinary shareholders' interest (ROSE) is not highlighted as a separate measure of financial performance, but should be regarded as complementary to ROE as ordinary shareholders' interest forms part of total shareholders' interest. The ROS (6,85) highlights the operational efficiency and effectiveness of the enterprise by complementing profitability ratios such as RONA and ROE. The use of operating income in place of EBIT in the ROS ratio, together with growth in sales, forms part of the determinants that are used to determine shareholder value.

Furthermore, growth in earnings per share (7,71), dividend per share (6,71) and magnitudes such as sales (7,00) and assets (7,00) are included in both the literature analysis and the proposed traditional performance indicators. The aforementioned indicators are specifically included as an indication of the overall growth and earnings potential of the enterprise. Growth in earnings is already included as part of EPS growth, while dividend per share (DPS) stresses aspects such as the retention ratio and the enterprise's dividend policy. The inclusion

of the debt to equity ratio (7,28) is acceptable in terms of the measurement of an enterprise's solvency position and its contribution to determining an acceptable rate of sustainable growth for the enterprise. The turnover to total assets scores an average of 7,71 for each criterion. Furthermore, this ratio forms part of the determinants which affect the sustainable growth and RONA of the enterprise.

Several ratios not discussed above, but which form part of Table 2.1, are not included as part of the proposed number of traditional performance indicators for the following reasons:

- Price earnings ratio is more market related and would complement the EPS and DPS. However, if the aim of the performance measurement is a more market-orientated analysis this ratio could be included.
- Equity growth, which implies an addition to external debt financing, is linked to the retention rate and consequently the growth in assets, and is therefore not included as a growth measure.

It would appear that an overall analysis after the application of the evaluation criteria emphasises the importance of sustainable growth (9,28), ROE (8,57) and RONA (8,42) as key indicators of traditional financial performance. This generally conforms to the importance given to RONA and ROE in the literature. However, sustainable growth is added to the list as an indicator, which offers an overall evaluation of the enterprise's growth position.

Indicators which do not form part of the "selected" number of traditional financial performance indicators in Table 2.1 should be used to highlight specific financial aspects related to the overall performance measurement guideline provided an appropriate set of indicators. For analytical purposes liquidity, coverage and turnover ratios such as those indicated in Figure 2.3 should be used as indicators that provide specific performance measurements, rather than emphasising a particular aspect of the enterprise's overall financial performance.

The nature of this process makes it susceptible to a certain level of qualitative judgement. Although a certain degree of subjective judgement is used to determine the relevance of the criterion for each performance indicator, the approach offers a broad-based methodology for

selecting performance indicators based on an application of a series of qualitative criteria. A score that is assigned to the criterion when determining the relevance of a performance indicator highlights the arbitrary nature of this type of approach. Therefore, this approach conceptually assesses the relevance of performance indicators, without using elaborate statistical analysis to allocate scores.

2.8.3 Specific issues related to traditional financial performance measurement

It is possible to indicate several specific issues related to the use and application of traditional financial performance indicators. These include:

- The lack of dynamism in traditional performance analysis
- The over-emphasis of traditional financial performance measurement
- The superficial insight provided by traditional performance indicators.

2.8.3.1 The lack of dynamism in traditional performance analysis

Contemporary financial performance measurement suggests that traditional indicators are outdated in terms of the dynamism of changing business financial decision-making and performance analysis. Therefore, financial performance becomes more than an analysis of the enterprise's financial position. The focus of traditional measures is on the immediate issues facing the enterprise. In other words, the emphasis is on the current situation and not on creating a balance between longer-term trends and financial performance. In this context the focus in financial performance measurement, it appears, needs to move away from traditional thought processes to other performance measurement approaches such as cash flow analysis and, more recently, value-creation performance analysis. The latter is not a performance indicator *per se*, but is the result of an improvement or decline in financial performance as indicated by the use of traditional and cash flow performance measures.

2.8.3.2 The over-emphasis on traditional financial performance measurement

Traditional indicators such as growth in earnings, dividend per share and earnings per share are generally used by enterprises to reflect financial performance. No adjustments are made for inflation, nor are the traditional indicators related to other performance indicators such as

cash flow. Financial investment decisions are generally based on an incomplete analysis of an enterprise's financial position and refer specifically to decisions which are based on earnings per share growth and ultimately the declaration of dividends (DPS). The financial consequences of an emphasis on traditional earnings and an increase in dividends could lead to the payment of dividends from other sources, which may be contrary to an accepted norm of paying dividends from profits.

2.8.3.3 The superficial insight provided by traditional financial performance indicators

In essence, a selection of traditional performance indicators should be used in a complementary and supplementary manner to analyse financial performance and support general business decision-making. Traditional indicators, which are often used exclusively to analyse financial performance, may be limited by the mostly static nature of performance measurement. This requires caution when interpreting the information provided by traditional indicators of financial performance. In addition, traditional RONA and ROE, for instance, which are limited by an absence of measurable standard performance criteria, are often used as individual measures of financial performance. For example, does a ROE of 15% represent an acceptable return, and could the enterprise be classified as financially successful?

It is apparent from the analysis in this section that traditional performance measures could provide an indication of past performance, for example, in earnings. However, this depends on the manner in which earnings are defined. The traditional performance analysis is mostly a static process of evaluation, while no indication is obtained of future perceptions or whether or not the governing objective of the enterprise, namely, maximising shareholder value, is being achieved.

A selected number of traditional indicators should form a first-level analysis of financial performance. It suggested that sustainable growth, ROE and RONA should be used to provide useful information about the enterprise's current position relative to its competitors or the business sector in which it functions. These indicators highlight both the income-generating ability of the enterprise through the use of available resource and emphasises the capital structure position through the use of the sustainable growth rate as an indicator which considers both internal and external capital requirements as well as the capital intensity ratio.

In this context other traditional performance indicators should complement and supplement the mainstream indicators, while enhancing cash flow and value-added performance measurement analysis.

2.9 Summary

This chapter provides the basis for an analysis of various aspects that relate to the traditional measurement of financial performance. The theoretical discussion focuses on a broad overview of various issues encountered in financial performance analysis and performance measurement. Throughout the second part of the chapter an analysis is conducted of the information content of various traditional performance ratios and broad-based implications for financial management are highlighted, which are generally caused by changes in these indicators over time. The basis for the discussion in the latter section of the chapter is based on a critical evaluation of the relevance of traditional indicators for financial performance measurement.

The first part of this chapter highlights the significance of financial performance analysis and the relevant use of financial indicators for performance measurement, as well as how the ratios are used to highlight financial success and ultimately long-term survival. During the discussion the need for appropriate and focused financial performance analysis is highlighted by creating an understanding of financial success measurement, the scope and relevance of financial performance analysis, issues related to maximising the information derived from financial performance measurement and emphasising primary categories of financial performance indicators.

Traditional financial indicators are one of several categories of indicators generally used to analyse financial performance. This section provides a theoretical discussion of profitability and growth as two main categories of traditional performance indicators. Various profitability and growth indicators that emanate from research studies of traditional financial performance are highlighted and their information content, usefulness and application for performance analysis are emphasised. In addition, several other traditional performance indicators, which emphasise a specific aspect of the enterprise's financial position, are also analysed. The incremental approach to traditional performance analysis is discussed in order to emphasise

the need to evaluate the information content of financial items over time when evaluating performance.

A critical evaluation of the traditional approach is provided in order to highlight the use and applicability of indicators used for measuring financial performance. The first part of this section argues the relative importance and use of traditional financial performance indicators. The need to evaluate and select a representative group of traditional financial performance indicators for further analysis in Chapters 7 and 8 is endorsed by the use of several qualitative evaluation criteria formulated for this section. The ratios are determined for both the CI and LI enterprises and analysed over an upswing and decline phase of the economic cycle. In addition, more specific issues related to the use of traditional financial performance measurement are also highlighted. This process commences with a "situation analysis" of a selection of studies which use traditional financial performance indicators for performance measurement. It appears that in the research literature over the past seven years traditional financial performance indicators are not generally used to analyse financial performance *per se*, while more often reference is made to relationships between financial performance and strategic planning, strategy implementation as well as organisational structure and status. The dissemination of financial results focuses on the use by enterprises of earnings-based indicators to highlight financial performance.

The formulation of several qualitative evaluation criteria to evaluate traditional performance indicators serves to determine the relevance of various indicators by assigning a particular score to each ratio. This enables the indicators to be ranked on the basis of the average score obtained from the application of the criteria to each ratio. It is suggested that sustainable growth, ROE and RONA should be used to provide useful information about the enterprise's current position relative to its competitors or the business sector in which it functions. These indicators highlight both the income-generating ability of the enterprise through the use of available resource and emphasise the capital structure position through the use of the sustainable growth rate as an indicator, which considers both internal and external capital requirements. In this context other traditional performance indicators should complement and supplement the proposed mainstream indicators. Furthermore, several key issues related to traditional financial performance measurement are highlighted to emphasise both the limitations and positive aspects of traditional financial performance. These include the lack of

dynamism in traditional performance analysis, an over-emphasis on the use of traditional financial performance indicators and the superficial insight provided by traditional performance indicators.

It should be re-emphasised that the traditional approach to performance measurement forms a first-level analysis for further and more in-depth evaluation of an enterprise's financial performance. The effects of inflation should be considered and analysed in the context of the expected future business prospects of the enterprise. Traditional financial performance indicators should not be seen in isolation, but as complementary to the cash flow performance analysis in Chapter 3, while RONA and ROE are specifically used to analyse value performance, discussed in Chapter 4. Various traditional ratios discussed in this chapter and calculated for the CI and LI enterprises during the upswing and decline phase of the economic cycle are statistically analysed and their behaviour patterns investigated in both Chapters 7 and 8.

FOOTNOTES

1. Ross *et al.* (1993) indicate that the external financing required to fund growth of operations is a function of growth in assets expressed as (A × g) and the addition to retained earnings indicated by PM(S)B[1+g].

Growth in assets = external financing required (EFN) + addition to retained earnings

$\therefore$ EFN = growth in assets – addition to retained earnings

$$EFN = (A \times g) - PM(S)B[1+g)$$

$$EFN = (A \times g) - PM(S)B[1 + g)$$
$$EFN = Ag - PM(S)B - PM(S)B \times g$$
$$EFN = -PM(S)B + Ag - PM(S)B \times g$$
$$EFN = -PM(S)B + [A - PM(S)B] \times g$$

Note: $PM(S)B = \frac{NI}{S} \times \frac{S}{1} \times \frac{ARE}{NI}$

$$EFN = -PM(S)B + [A - PM(S)B] \times g \quad \text{.....(1)}$$

1.1 Calculation of internal growth rate:

The internal growth rate is derived from equation (1) by making EFN = 0 and solving the equation for g.

$$EFN = -PM(S)B + [A - PM(S)B] \times g$$
$$0 = -PM(S)B + [A - PM(S)B] \times g$$
$$g = \frac{PM(S)B}{A - PM(S)B}$$
$$= \frac{(RONA \times CI) \times (S) \times B}{A - (RONA \times CI) \times (S) \times B}$$
$$= \frac{RONA \times \frac{A}{S} \times S \times B}{A - (RONA \times \frac{A}{S} \times S \times B}$$
$$= \frac{RONA \times A \times B}{A - (RONA \times A \times B)}$$
$$= \frac{RONA \times A \times B}{A(1 - RONA \times B)}$$
$$= \frac{RONA \times B}{(1 - RONA \times B)}$$

1.2 The sustainable growth rate is also derived from equation (1) and is based on:

$$ROE = \frac{NI}{S} \times \frac{S}{A} \times \frac{A}{E} \text{ equal to } ROE = RONA \times EM \,^{1}, \text{ where } RONA = \frac{NI}{S} \times \frac{S}{A}$$

$$0 = -PM(S)B + [A - PM(S)B] \times g$$

$$g = \frac{PM(S)B}{A - PM(S)B}$$

$$= \frac{(RONA \times CI) \times (S) \times B}{A - (RONA \times CI) \times (S) \times B}$$

$$= \frac{\frac{NI}{S} \times \frac{S}{A} \times \frac{A}{S} \times \frac{A}{E} \times S \times B}{A - (\frac{NI}{S} \times \frac{S}{A} \times \frac{A}{S} \times \frac{A}{E} \times S \times B)}$$

$$= \frac{\frac{NI}{E} \times A \times B}{A - (\frac{NI}{E} \times A \times B)}$$

$$= \frac{ROE \times A \times B}{A(1 - ROE \times B)}$$

$$= \frac{ROE \times B}{(1 - ROE \times B)}$$

Key to abbreviations relevant to the above equations:

EFN = external finance needed;
A = total assets;
S = sales;
g = projected growth in sales;
PM = profit margin (RONA x CI);
B = retention rate;
E = total equity;
NI = net income;
ARE = addition to retained earnings;
CI = capital intensive (assets to sales);
EM = equity multiplier (assets/equity)
RONA = return on total net assets
ROE = return on total shareholders' interest

2. The real growth is calculated as follows: $\left(\frac{1 + 0{,}20}{1 + 0{,}153}\right) - 1$.

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1 The equity multiplier is by definition equal to 1, which is adjusted by the debt to equity ratio (see Ross *et al.*, 1993: 58)

CHAPTER 3

THE USE OF CASH FLOW INDICATORS FOR THE MEASUREMENT OF FINANCIAL PERFORMANCE

3.1 Introduction

The concept of cash flow has developed over the past number of years as an important part of the evaluation criteria applied in financial performance measurement. Cash flow analysis provides information about the source and application of financial means over a period, usually a financial year, and also attempts to address several limitations associated with traditional financial performance measures. All companies are required to include a statement of cash flows in their annual financial statements, which serves to magnify the cash flow position of the enterprise in the interest of all stakeholders. Although the statement of cash flow is a relatively new addition to financial reporting, it is generally regarded as a useful management and financial performance analysis tool.

This chapter complements and supplements the analysis of traditional financial indicators discussed in Chapter 2. The behaviour of both the selected traditional performance ratios and cash flow indicators are analysed in the primary research for both the CI and LI enterprises during both an upswing and decline phase of the economic cycle. In addition, the cash flow ratios also enhance the analysis of traditional financial performance indicators.

This chapter is divided into three parts. Part one discusses the concept and significance of cash flow as a measure of financial performance. Part two describes the structure of cash flow performance measurement by focusing on several elements in the cash flow statement, which represents the flow of funds in the enterprise. Furthermore, various cash flow performance measurement indicators are highlighted and discussed with a particular emphasis on the functional application of the indicators. These indicators are useful for analysing various financial issues and management decision-making situations in the enterprise. Part three focuses on the link between traditional and cash flow financial performance measures and

briefly provides an analysis of the relationship between cash flow and the inflation-adjusted figures. The final section provides a critical evaluation of cash flow performance measurement by highlighting the relevance and usefulness of cash flow indicators. An application of evaluation criteria to selected cash flow indicators and the specification of critical pointers related to the use and application of cash flow indicators in financial performance measurement are also discussed in this section.

3.2 The concept and significance of cash flow

The majority of financial performance applications such as cash flow analysis have their loyal proponents and those who critique the practical relevance of the concept. The term "cash flow" is not unambiguously defined, and therefore suggests different meanings to different users. The multiplicity of cash flow definitions and methods of analysis resulted in confusion and criticism of the concept and subsequent division between proponents of "cash" and the "accrual" or traditional approaches of financial performance analysis (Sondhi, Sorter and White, 1987: 57).

The classic definition of cash flow adds deferred taxes, depreciation and amortisation to net income after tax, ignoring capital expenditures and dividends (Dreyfus, 1989: 4). Hunt (1975: 108) believes cash flow does not represent actual cash on hand, but the potential of cash and is therefore actually a misnomer. The net cash flow (which generally represents the net result of the difference between cash inflow and cash outflow) is not entirely cash flow, but it is actually a mixture of cash and promises (promises accepted by debtors and promises made to creditors, both as part of changes which occur in net working capital) (Hunt, 1975: 109). Cash flow movements in stock, for instance, imply that an increase in stock levels causes an outflow of cash, while a reduction in stock levels causes an inflow of funds due to sales; this is an elementary practical example of cash flow. Charitou and Ketz (1991: 54) suggest that the concept of cash flow could be dangerously misleading because reported cash flows do not reflect "true" or actual cash flow. The problem stems from the notion that cash flow represents net income after taxation by adding back the depreciation.

Conversely, the advocates of cash flow, which include various United States corporations and institutional investors, place an increasing emphasis on cash flow analysis to make investment

decisions and to keep enterprises from being "disasterised". Even the proponents of cash flow admit that there are certain problems. For instance, they disagree about what cash flow is, whether or not post- or pre-tax income should be used, what amount, if any to subtract from capital spending, and whether or not debt repayments and dividends are discretionary expenses (Dreyfus, 1989: 4). Despite disagreement regarding the definition of cash flow, there is a general perception that cash flow should be analysed over long periods of time. A minimum of five years is suggested to avoid aberrations caused by high capital expenditure outlays in one year or by the sale of an asset in another.

A further view expressed by the CEO of Pepsico is that cash flow analysis is the company's preferred manner to measure how it is doing, although earnings (traditional indicator of performance) remain the mainstream approach. Another enterprise in the United States contends that, as a litmus test for value, cash flow provides a better yardstick due to the scepticism about earnings as a guide to stock values (Dreyfus, 1989: 2). The apparent differences between cash flow, income and earnings form the basis for further discussion.

3.2.1 Cash flow as opposed to accounting income and earnings

The necessity to focus on cash flow rather than earnings stems from the short- and long-term financial obligations of the enterprise. Net cash flow inflow provides a guide to the quality of an enterprise's income, while income is not necessarily a reliable measure of financial performance. The reasons for the use of net cash inflow in stead of income is due to problems which exist with the calculation of income as opposed to net cash inflow. Several of these problems include (Lambrechts, Reynders and Scheurkogel, 1986: 93):

- the consideration of when sales should be considered as income.
- the consideration of payments or obligations as a cost or investment.
- the choice of a method of depreciation for income purposes as opposed to taxation purposes.
- the choice of a stock valuation method.

A difference between net income and cash flow is the manner in which depreciation is accommodated in the financial statements. Traditional accounting procedures deduct

depreciation as an operating expense, while in terms of cash flow, depreciation is not an item which results in a flow of funds. Therefore, depreciation should be added back, which implies that net cash flow represents net income plus depreciation (Brigham and Capenski, 1991: 38). The effect of the straight-line method and reduced balance method of depreciation on cash flow is illustrated in the following examples. Assume an asset has a cost price of R10 000, depreciation is calculated at 20% and based on the two methods mentioned above. Sales represent R100 000 and costs excluding depreciation are 40% of sales. The results of the application of the two methods of depreciation are indicated in Tables 3.1 and 3.2.

Table 3.1: An illustration of the straight-line method of depreciation

	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Sales	100 000	100 000	100 000	100 000	100 000
Cost (excluding depreciation)	40 000	40 000	40 000	40 000	40 000
Depreciation	2 000	2 000	2 000	2 000	2 000
Net income	58 000	58 000	58 000	58 000	58 000
Tax (40%)	23 200	23 200	23 200	23 200	23 200
Net income after tax	34 800	34 800	34 800	34 800	34 800
Depreciation	2 000	2 000	2 000	2 000	2 000
Net cash flow	**36 800**	**36 800**	**36 800**	**36 800**	**36 800**

Table 3.2: An illustration of the reduced balance method of depreciation

	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Sales	100 000	100 000	100 000	100 000	100 000
Cost (excluding depreciation)	40 000	40 000	40 000	40 000	40 000
Depreciation	2 000	1 600	1 280	1 024	819
Net income	58 000	58 400	58 720	58 976	59 181
Tax (40%)	23 200	23 360	23 488	23 590	23 672
Net income after tax	34 800	35 040	35 232	35 386	35 509
Depreciation	2 000	1 600	1 280	1 024	819
Net cash flow	**36 800**	**36 640**	**36 512**	**36 410**	**36 328**
Difference between straight-line and reduced balance method of depreciation	R 000	R 160	R 288	R 390	R 472

It is clear that the straight-line method provides a higher net cash flow for the enterprise than the reduced balance method over the five-year period. When working with capital assets of substantial amounts these differences become very significant in terms of the enterprise's ability to use internal funding to cover the expenditure related to asset replacement and the acquisition of new assets.

A distinction should be made between operating cash flow, which is generally considered as sales minus operating expenses, and accounting income. Brigham and Capenski (1991: 40) use differences in taxation and credit sales to distinguish between cash flow and accounting income. Firstly, the tax liability of an enterprise is not normally settled in one particular financial year, but may be deferred over several years. The focus of cash flow is always on the current financial year and the actual cash tax payment may exceed the tax figure deducted from sales, which is required to calculate income. Secondly, credit sales do not represent cash, while several of the expenses (or costs) deducted from sales to determine profits may not be cash costs.

Ellis and Williams (1993: 172) stress four aspects of accounting which cause differences between profit and cash:

- Timing difference between when cash is paid and received
- The effects of depreciation
- Accounting transactions, which are recorded in the balance sheet, but do not flow through the income statement. This is generally referred to as flow-through accounting.
- Changes in working capital requirements.

It should be noted that cash-based performance analysis is not a new addition to financial performance measurement. Prior to the publication of the cash flow statement many surrogates for cash from operations were used (Hamman, 1993/1994: 49). Several examples include:

- net income after taxation plus depreciation
- net income after taxation plus depreciation plus deferred tax
- net income plus depreciation plus or minus changes in working capital.

The cash flow statement offers a complementary form of analysis to the enterprise's financial position. In addition, it provides a standardised format for financial performance evaluation and further indicates the relationship between beginning and year-end financial figures in the balance sheet and a figure for the whole year in the income statement.

3.3 Cash flow performance measurement and analysis

An analysis of the literature confirms that many authors emphasise the relevance of cash flow and cash flow indicators for financial performance measurement (Bosch and Du Plessis, 1994; Hamman, 1994 and 1993/1994; Schmidgall, Geller and Ilvento, 1993 and Giacomino and Mielke, 1993). The analysis of cash flow performance is discussed from two perspectives, i.e. an analysis of funds flow, which highlights the various categories of financial information expressed in the cash flow statement, and a discussion of cash flow performance indicators. Figure 3.1 provides a representation of cash flow performance analysis and indicators which could possibly be used to measure the financial performance of either or both CI and LI enterprises during a period covering either or both an upswing or decline phase of the economic cycle.

3.3.1 The relative performance of cash flow

The proposed cash flow relative performance index illustrates the ability of the enterprise to evaluate its financial efficiency by analysing five components found in the cash flow statement (Gentry, 1983). The summation of these five components minus net fixed coverage equals the change in cash and marketable securities. All the funds flow components are indicated in Figure 3.1 under the analysis of funds flow. Each component is discussed by providing an overview of the financial statement figures which have an effect on cash flow.

3.3.1.1 Operating cash inflow and outflow

Operating cash flow is an essential part of any cash flow analysis, primarily because it represents the ability of the enterprise to generate funds from normal business activities. Operating inflows are composed of all inflows of which sales is the primary source. Noteworthy is the comment by Hamman (1994: 68), who warns of the dangers of excessive sales growth and the subsequent effect on the working capital requirements of the enterprise, especially if the cash conversion cycle is not adapted to reflect the increasing need for cash resources to finance stock purchases and the difference between debtors and creditors. Operating outflows are composed of expenditures related to stock purchases, selling and advertising expenses, taxes, research and development, rental and operating lease obligations, extraordinary items and minority interest claims.

The consequences of excessive sales growth are further emphasised by a poor cash flow from operating activities. This necessitates the enterprise to use reserves to fund dividend payouts. A shortage of funds stems from the enterprise's sales growth which exceeds its cash flow sustainable growth rate (Hamman, 1994: 69). As a result it is likely that cash generated by operating activities would become negative. If a situation of negative cash flows from operating activities continues for an extended period of time, it is likely that the enterprise will experience financial difficulties, unless the enterprise can fund the negative operating activities by means of an equity (including a rights) issue.

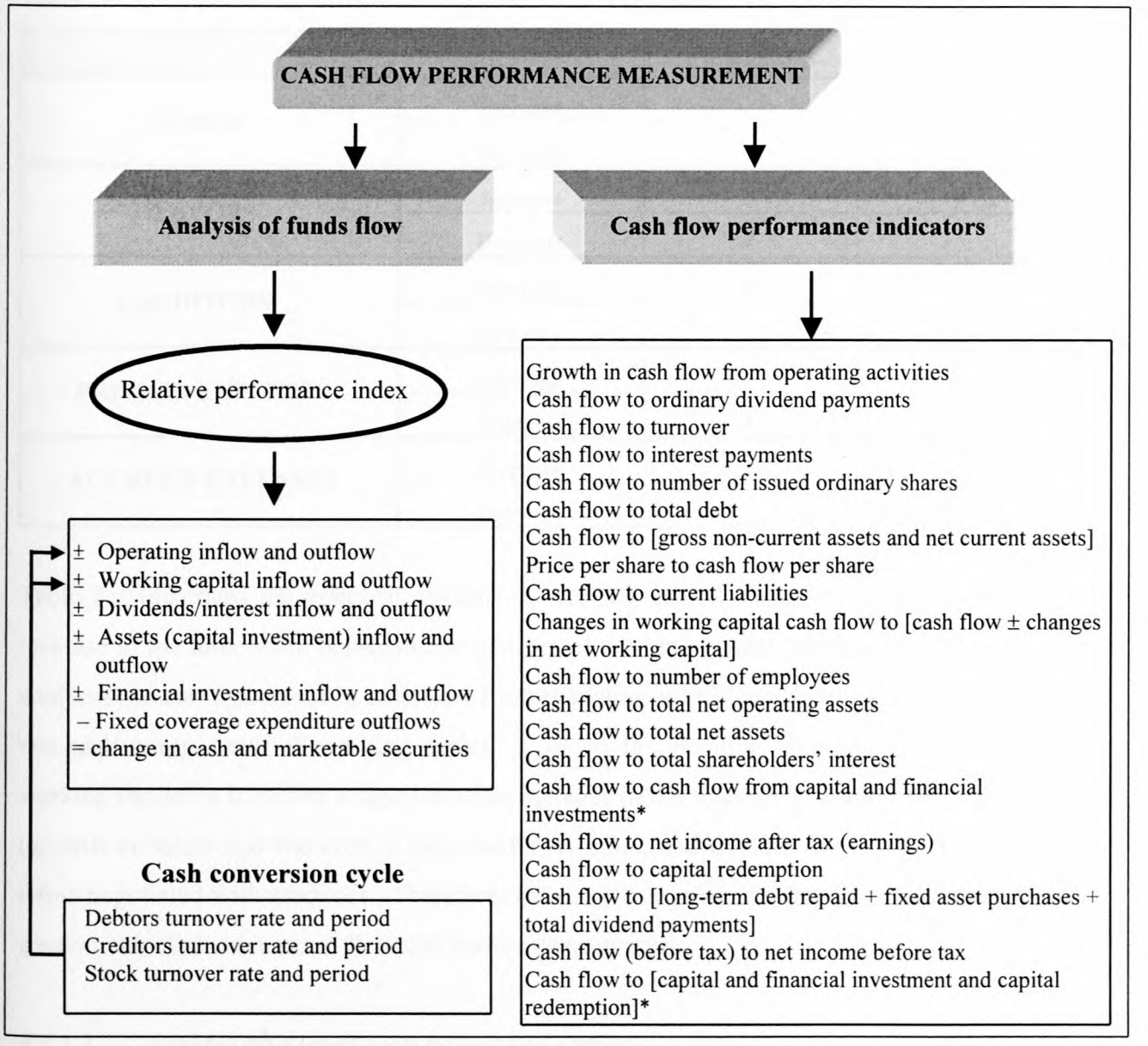


Figure 3.1: A representation of funds flow and cash flow indicators used for performance analysis (Sources: Gentry, 1983; Lambrechts, 1992; Giacomino and Mielke, 1993; Schmidgall *et al.*, 1993; Hamman, 1993/1994 and 1994)

* User-defined ratios added to the list of cash flow ratios

3.3.1.2 Working capital cash inflow and outflow

Working capital requirements form an integral part of cash flow from operating activities and generally consists of several components, which include stock, debtors, creditors, expenses prepaid and accrued, and income tax prepaid and accrued (Foster, 1986: 78). Table 3.3 illustrates the effect of cash inflow and outflow on decreases and increases in each of the above mentioned non-cash working capital elements.

Table 3.3: The effect of an increase or decrease in working capital on cash flow

		Cash inflow	Cash outflow
STOCK	**Increase**		✓
	Decrease	✓	
DEBTORS	**Increase**		✓
	Decrease	✓	
CREDITORS	**Increase**	✓	
	Decrease		✓
PREPAID EXPENSES	**Increase**		✓
	Decrease	✓	
ACCRUED EXPENSES	**Increase**	✓	
	Decrease		✓

Table 3.3 illustrates the effect of changes in working capital cash flows. For instance, an increase in the three main non-cash components of working capital (stock plus debtors minus creditors) causes a decrease in cash flow from operating activities, while the decrease in these non-cash components of working capital is added to operating income. The changes in working capital is therefore a function of an increase in the scale of an enterprise's operations (growth in sales) and the control exercised over stock and debtors as well as the payment terms negotiated with creditors. Therefore, the growth in sales and the cash conversion cycle are two essential elements in financial performance analysis.

3.3.1.3 Dividends/interest cash inflow and outflow

Although returns on investment and financing costs do not directly form part of the operating (business) activities of the enterprise, these items form part of the total enterprise activity.

Gentry (1983) proposes that returns received from financial investments should be set off against the cost of financing mechanisms such as share capital (dividends) and debt (interest). This would assist the enterprise to analyse the income from investments and the payments related to financing mechanisms.

3.3.1.4 Capital (asset) investment cash inflow and outflow

Cash flow related to capital assets are generally defined as the cash outflow represented by the acquisition of property, plant and equipment, intangibles and other long-term assets (Coetsee, Stegmann, Van Schalkwyk and Wesson, 2000: 588). A cash inflow may arise from the sale of property, plant or equipment, intangibles and other long-term assets (Coetsee *et al.*, 2000: 588). However, it is important to analyse the size of the cash purchase in relation to the cash flow from operations and the possibility of having to acquire external financing.

3.3.1.5 Financial investment cash inflow and outflow

Financial investment refers to the purchase or sale of financial assets with the aim of achieving capital income, dividends or interest. The cash flow from financial investments is dictated by an enterprise's financial investment policy, but forms an integral part of the total investment activities of the enterprise. Cash flow from financial investments forms part of the total (capital and financial) investment activity of the enterprise and forms part of the investment activity section in the cash flow statement.

Examples of cash outflow include payment for equity or debt instruments of other enterprises, interests in joint ventures, cash advances and loans made to other parties, futures contracts, forward contracts, option contracts and swap contracts (Coetsee *et al.*, 2000: 589). The sale of equity or debt instruments of other enterprises, interests in joint ventures, repayment of advances and loans made to other parties and receipts from futures contracts, forward contracts, option contracts and swap contracts are examples of cash inflow (Coetsee *et al.*, 2000: 589). It should be noted that dividends and interest received are excluded from financial cash inflows.

3.3.1.6 Financial cash flow

Financial flows are defined as the mechanisms required to finance the shortfall caused by insufficient operating cash flow. The mechanisms include issuing of share capital and obtaining debt capital in the form of loans or bank overdrafts.

3.3.2 Performance analysis of cash flows

It is clear from section 3.2.1 that earnings *per se* are not the most appropriate indicator of an enterprise's financial performance, and that attention should also be given to cash flow-generation potential. The financial success (or failure) of an enterprise is related to the level and speed that the cash flows through the enterprise (Gentry, 1983). The higher the level and/or speed of cash flow through the enterprise, the smaller the probability of failure, or conversely the greater the possibility of success.

The level of cash flow rises when either the quantity of products (volume), the profit margin or the price of the goods sold increases to compensate for lower volumes. When the cost of operations for a given level of sales volume decreases the level of cash flow improves. This is coupled to an increase in the speed of cash flow through the enterprise when sales are increasing at the same level of investment, i.e. the turnover to total net assets ratio increases. This ratio should be seen in relation to management efficiency ratios such as labour costs as a percentage of sales and overheads as a percentage of revenue (Owen, 1994: 368).

Gentry (1983) contends that measuring the change in the level and speed of each cash inflow and outflow component provides a theoretical basis for analysing the success (or failure) of the enterprise. The following deductions are made with respect to the inflow and outflow of cash components and their effect on financial performance of the enterprise:

- The larger the positive difference between the cash inflow from operations and the cash outflow the greater the financial strength of the enterprise.
- The larger the proportion of the net cash outflow for capital investment, the greater the possibility for financial success and the smaller the probability of failure. This depends on whether or not the incremental rate of fixed investment increases as the growth rate

in sales increases (see also section 4.3 of Chapter 4). If the latter is maintained, it is possible for the enterprise to sustain its growth over the long term.

- The smaller the proportion of net cash inflow from outside borrowing, the smaller the debt burden and the greater the probability of financing from internal sources. This discloses that the higher the net cash flow from operations the smaller the reliance on borrowing from external sources. The converse is also true in respect of a decrease in net operating cash flow.
- The smaller the proportion of net cash outflow used to finance interest and leasing expenditure items, the smaller the probability for negative cash flow and the greater the probability to improve financial performance.
- If the proportion of net cash outflow for net working capital requirements is smaller, then the probability to improve operating financial performance is enhanced. The net working capital is considered under control when the rate of increase is lower than the corresponding increase in sales. Working capital components are imperfectly related to sales, but the relative increase in the turnover rate of debtors (accounts receivable) and stock (inventory) to the relative decrease in the turnover rate of creditors (accounts payable) increases internal operating efficiency.
- The larger the relative proportion of net cash flow available for dividends, the more shareholders are assured that sufficient funds are available to pay dividends.

3.4 Information content and analysis of cash flow indicators

Detailed analyses of the preceding inferences are necessary in order to adequately analyse the financial performance of an enterprise. However, it is essential that this type of analysis be conducted over time and that the cash flow information used in performance analysis is consistent over the period of analysis and across all peer enterprises. In other words, the cash flow statements should be standardised in a format which facilitates financial performance analysis and management decision-making. In this regard Lambrechts (1994: 46) proposes a revision of the AC118 accounting guideline for the cash flow statement which relates to cash flow from all operations.

For the purposes of the discussion the section dealing with cash flow from total activities in the cash flow statement is illustrated in Table 3.4. The other sections of the cash flow statement, i.e. investment activities and financing activities, are similar to the existing accounting guideline for cash flow statements.

Table 3.4: A representation of the elements of net cash flow from total activities

Income before interest and taxation - EBIT
Plus: Depreciation
(Profit)/Loss on disposal of fixed assets*
(Investment income)
(Increase)/decrease in net current working capital (i.e. stock, debtors and creditors)
Cash from operating activities (COA)
Plus: Investment income
Cash from total activities (CTA)
Less: Financing costs
Less: Taxation paid
Cash available from total activities (CATA)
Less: Dividends paid
Net cash from total activities (NCTA)

* The items in parenthesis are subtracted
Source: Lambrechts, 1994: 45-46

An analysis of the components in the cash flow statement enables cash to be segregated by origin, which implies that the cash flow statement reflects net cash flow from three activities, i.e. operations, investment activities and financing (Gordon, 1992: 44; Stickney, 1990: 18). The cash flow performance indicators relate to one of the sub-sections of net cash flow from total activities indicated in Table 3.4.

Before discussing the information content of the various cash flow performance indicators, it is necessary to determine several categories of measurement activity that offer useful insights into the application of cash flow indicators. The cash flow performance indicators intend to inform and provide a guideline for management decision-making, which relates to the measurement of operating performance, working capital performance, funding of capital purchases and acquisitions as well as the financing performance of the enterprise. The four categories of measurement activity indicated in Table 3.5 are similar to the primary categories found in the cash flow statement. In addition, relevant cash flow performance indicators are

suggested for each measurement category that affect the operational and strategic activities of the enterprise.

Table 3.5: The use of cash flow indicators as a guideline to improve management decision-making

1. Measurement of operating cash flow performance	
CATA (before tax) to net income before tax	CATA to turnover (3.4.7)
Growth in cash flow from operating activities	Changes in working capital cash flow to CTA (± changes in net working capital) (3.4.15)
CATA to total net operating assets (3.4.9)	CATA to total net assets (3.4.10)
2. Measurement of working capital performance	
Changes in working capital cash flow to CTA (± changes in net working capital) (3.4.15)	CATA to turnover (3.4.7)
3. Measurement of ability to fund capital purchases and acquisitions	
NCTA to [long-term debt repaid plus fixed asset purchases plus total dividend payments] (3.4.4)	NCTA to cash flow from capital and financial investments (3.4.14)
NCTA to [gross non-current assets and net current assets] (3.4.6)	
4. Measurement of short- and long-term financial performance	
CATA to current liabilities (3.4.1)	NCTA to [long-term debt repaid plus purchases of assets plus dividends payments] (3.4.4)
[CATA minus preference dividends and minority shareholders' interest] to ordinary dividend payments (3.4.5)	CTA to interest payments (3.4.8)
CATA to total debt (3.4.11)	CATA or NCTA to capital redemption (3.4.12)
[CATA minus preference dividends and minority shareholders' interest] to total shareholders' interest (3.4.17)	NCTA or CATA to number of issued ordinary shares (3.4.3)
Price per share to cash flow per share (3.4.13)	NCTA to number of employees (3.4.16)

Note: The figures in parenthesis refer to the section number of the performance indicator.

The need to analyse working capital as a separate measurement activity highlights the importance of working capital flows in the overall evaluation of operating cash flow performance. Note, it is possible that a particular cash flow indicator or cash flow index figure may be used to analyse more than one activity. Several traditional performance indicators highlighted in Chapter 2, which complement the discussion of the various cash flow performance indicators, are in bold print.

3.4.1 CATA to current liabilities

The CATA is used in this instance to indicate the enterprise's ability to cover total current liabilities less creditors, which are already accounted for in the working capital requirements. This figure highlights the liquidity position of the enterprise and therefore management's ability to repay short-term debt. During periods of high interest rates the cash flow position of the enterprise would be adversely affected due to higher interest repayments. It would be useful to analyse this liquidity indicator together with traditional performance measures such as the **current ratio** and the **acid test ratio**. A cash liquidity ratio of approximately 40% would be a more than adequate benchmark for assessing the short-term financial position of the enterprise (Schmidgall *et al.*, 1993: 51).

3.4.2 CATA to net income after tax (earnings)

This indicator is related to the operations of the enterprise. Net income alone is a poor measure of operations because it involves subjective judgements, which generally refer to accrual, allocation and valuation issues. This ratio also overcomes certain of the limitations prevalent in the traditional income ratios. The higher the ratio the greater the cash available from total activities to net income after tax. In addition, the ratio measures the quality of the income attributable to shareholders. This implies that the higher the value above 100%, the higher the quality of the attributable income. Shareholders would anticipate a high percentage in order to ensure a reasonable dividend payout.

3.4.3 NCTA or CATA to number of issued ordinary shares

The cash flow per share is also referred to as a short-term profitability indicator. This ratio should also be seen in conjunction with the traditional performance measure **earnings per share** (EPS), since earnings and cash flow do not correlate over the short term (Gordon, 1992: 66). This comparison is important in terms of the indication provided by these ratios to shareholders regarding the portion of income and cash that could be rightfully claimed by them as co-owners of the company.

3.4.4 NCTA to [long-term debt repaid plus fixed asset purchases plus total dividend payments]

Giacomino and Mielke (1993: 56) regard this measure as a cash flow adequacy ratio, which measures the enterprise's ability to generate cash sufficient to pay its debt, reinvest in its operation, and distribute dividends to its shareholders. Moreover, this ratio could also be seen in the context of the enterprise's **fixed charge coverage ratio**, a traditional indicator which provides an indication of the enterprise's ability to meet its total fixed coverage obligations in the short term and long term (Brigham and Capenski, 1991: 881). The fixed charge coverage ratio is calculated in the following manner: [earnings before income and tax plus lease payments plus depreciation] divided by [interest and lease payments plus sinking fund contributions/(1–t) plus preference dividends/(1–t)], where (t) is an appropriate tax rate.

In addition, this ratio assists management to collectively analyse long-term financial commitments. It would also assist management to determine how much cash is required to provide financial cover for the enterprise after considering the movements in external funding, investment activities and total dividend payments.

3.4.5 [CATA minus preference dividends and minority shareholders' interest] to ordinary dividend payments

In essence this ratio indicates whether or not cash flow is indeed sufficient to justify dividend payments. It also reflects the number of times an enterprise would be able to pay dividends from its discretionary (after provision is made for debt payments) cash flow from operations. The higher the ratio, the more money is being reinvested by the enterprise. Giacomino and Mielke (1993: 57) classify this measure as a sufficiency ratio as it describes the adequacy of cash flow for meeting an enterprise's needs. This coverage ratio indicates to shareholders the ability of the enterprise to make dividend payments. In addition, expected shareholder returns and the potential of the enterprise to consistently declare dividends over time affect this indicator.

Furthermore, management should also compare the **ordinary dividend cover in the income statement** (e.g. 2,4 times) to ordinary dividend cover in the cash flow statement (e.g. 0,56 times). By analysing the traditional and cash flow indicators, shareholders would obtain a

better perspective on whether or not dividends are being paid from other sources such as distributable reserves.

The decision to declare dividends depends on various factors, including the reinvestment and dividend policy of the enterprise, the enterprise's current cash flow position and envisaged business growth strategies. It is therefore possible to identify two extremes, i.e. enterprises that have a high dividend payout ratio, and conversely those which re-invest a major part of the income attributable to shareholders. The risk of a high dividend payout ratio may result in the enterprise not being able to take advantage of growth prospects and this may lead to under-capitalisation. On the contrary, those enterprises which follow a conservative dividend policy run the risk of not attracting shareholder interest and may further tarnish their image in terms of the returns current shareholders would expect to achieve on their investment.

3.4.6 NCTA to [gross non-current assets and net current assets]

This ratio is generally known as the cash-reinvestment ratio. In the description above gross non-current assets refers to property, buildings, equipment and investments (ignoring accumulated depreciation) and net working capital (current assets minus current liabilities). Schmidgall *et al.* (1993: 50) suggest that this indicator is useful for measuring the percentage of the investment in assets that is available to be reinvested in both asset replacement and expansion. In addition, this ratio also indicates the enterprise's capability to fund capital purchases. The greater the reinvestment the greater the expected future cash flow from operations. A cash-reinvestment ratio of eight to ten percent is considered as a reasonable benchmark (Bernstein, 1990: 567-568). The information content of this ratio could aid management to make adequate purchasing and acquisition decisions which would strategically position the enterprise in a competitive market.

3.4.7 CATA to turnover

The cash flow margin indicates the cash-generating ability of the enterprise that results from turnover. This ratio is similar to the **net income margin**, a traditional performance measure discussed in Chapter 2. The ratio indicates the percentage of cash available from total activities for every one Rand of turnover generated. Giacomino and Mielke (1993: 57) regard the cash flow margin as an efficiency ratio, which describes how well the enterprise generates

cash flow relative to both other financial periods and peer enterprises. In addition, this margin provides an indication of the internal cash flow position from the perspective of the ability of the enterprise to generate turnover. Furthermore it also offers an indication of the management policy regarding depreciation and net working capital.

3.4.8 CTA to interest payments

Schmidgall *et al.* (1993: 51) believe interest coverage provides some indication of the solvency position of the enterprise and is similar to the traditional **times interest earned** ratio. The ratio analysis the ability of the enterprise to make interest payments from available income and cash. The larger the ratio the less the risk to debt providers and the greater the ability of the enterprise to cover its debt service.

3.4.9 CTA to total net operating assets

The relevance of this ratio is applicable to the operational analysis of the enterprise's activities. Furthermore, the manner in which total net assets are used in the enterprise's operating activities to generate cash flow gives some indication of management's ability to operate in an efficient and effective manner. If the enterprise returns a low ratio it could be useful to analyse the financial position in terms of the cash flow to fixed capital investment and cash flow to investment in current assets. These indicators may point to the possibility of restructuring the asset base of the enterprise in order to improve efficiency.

In this context, it could be useful to compare the level of spending on investments to the amount by which management depreciates assets (Ellis and Williams, 1993: 185). For example, if the enterprise's assets increase by R50 million and depreciation increases by R23 million, the capital spending on assets by management is approximately twice the level at which the assets are being written off. The enterprise then becomes a net investor in fixed assets.

3.4.10 CATA to total net assets

This ratio could also be regarded as a cash flow return on total net assets, which indicates the capacity of the enterprise to use its assets to generate cash flow in relation to the size of the

asset base. It could possibly be related to traditional ROA, which is calculated as operating income after tax to total net assets. Giacomino and Mielke (1993: 57) indicate that cash flow return on total net assets is an efficiency ratio, which enables both time-based analysis and benchmarking with an enterprise's peers. It is expected that the cash flow and traditional return on total net assets ratio would differ on the basis of differences between income and cash flow.

3.4.11 CATA to total debt

The ability of the enterprise to meet its long-term debt obligation is highlighted by this ratio. Besides the traditional solvency indicators of **total net assets to total debt**, there is no recognition of the ability of an enterprise to generate cash flow from operations, which is required to service debt (Stickney, 1990: 243). Schmidgall *et al.* (1993: 49) believe the focus on cash flow becomes more relevant when referring to the varying liquidity levels of assets that are required to cover various levels of debt. It is therefore necessary for the enterprise to know the extent to which its cash flow from operations can cover debt. A ratio of 20% is suggested as reasonable for this performance indicator (Schmidgall *et al.*, 1993: 50). The debt situation could also be analysed from the time it takes to repay debt. For instance, if it is 100% the time frame is one year, 200% implies a time frame of six months and 50% indicates two years.

3.4.12 CATA or NCTA to capital redemption

If the option to finance with equity capital is not available to the enterprise, the alternative is to use debt capital. Management needs to convince lenders that the solvency position of the enterprise is sound and the ability to repay capital adequate. As a first indication, debt capital providers will be interested in a ratio such as CATA to capital redemption. This ratio provides an indication of the enterprise's ability to redeem capital from generated cash flow. A ratio of smaller than one suggests that insufficient funds are available to cover capital repayments, which consequently results in a need for more short-term debt financing.

3.4.13 Price per share to cash flow per share

The traditional price earnings (PE) performance indicator is analysed in a similar manner to the price to cash flow indicator. It may be expected that the two ratios could differ quite substantially, primarily because cash flow and earnings are indirectly being compared. However, both ratios would provide shareholders with an indication of the level of the share price to cash flow or earnings. In addition, the ratios enable an evaluation of the status and relative value of the share in terms of its affordability for potential investors.

3.4.14 NCTA to cash flows from capital and financial investments

Generally, this indicator refers to the funds position of the enterprise. It indicates to what extent cash from operating activities could finance investment in fixed assets. In other words, the ratio assesses the ability of the enterprise to generate cash flow from operations in excess of capital expenditure (Hunt, 1975). If the ratio is less than one, external sources of financing are required that could affect the solvency and risk position of the enterprise over the long term. However, in most cases external financing is required for investment purposes. It is therefore necessary to obtain an adequate mix of internal to external financing by analysing the gearing position of the enterprise.

A profile should be compiled of the enterprise's cash flow from operations and be combined with capital requirements to serve as an indicator of a series of negative and positive cash flows over time (Hunt, 1975: 114). For a growing enterprise this profile could be negative, which would indicate a need for external financing. The rationale behind expansion and growth is to conduct the activities of the enterprise in a manner which is befitting of management's strategic plans (see also section 2.6.3 of Chapter 2).

An acquisition policy could place a major strain on the cash flow position of the enterprise. Ellis and Williams (1993: 187) indicate that investment activities give no indication of the wisdom of the purchase, but simply indicate the cash flow implications. In order to acquire an asset of a large financial magnitude, an analysis is required of the size of the capital amount in relation to the current cash flow position of the enterprise. For example, if the size of the asset or acquisition is more than the total investments made during the past financial year, this clearly raises a question about the method of financing. In order to assess the financial

position of the enterprise, it is necessary to know how much cash is required to maintain the financial position after the acquisition.

Furthermore, it is possible that the **growth in cash flow from operating activities** could appear to be acceptable in nominal terms. However, a negative growth in cash flow may result should the analysis be conducted in real terms. It would be useful to analyse the growth in cash flow from operations over a one- and five-year period in order to obtain a perspective of the funds position of an enterprise.

3.4.15 Change in working capital cash flow to CTA (± changes in net working capital)

In order to determine whether or not the increase in current assets is fully covered by the cash from operations, it is necessary to refer to this indicator. Furthermore, this ratio indicates whether excessive amounts of cash are absorbed by current assets, which may appear abnormal when analysed together with changes which occur in cash flow from operations.

This figure provides some indication of the effect that changes in stock, debtors and creditors have on the cash flow from operating activity. In order to analyse the changes in net working capital, an analysis of several traditional financial ratios such as the **stock turnover rate, debtor's turnover rate** and **creditor's turnover rate** is required. The information obtained from analysing these indicators over several years should indicate what changes in business activity are required to effect changes in the three turnover rates. The "best practice" situation would be to achieve a higher stock turnover rate, reduce the repayment period of debtors and extend the payment period of creditors.

Robinson and Lambke (1989: 28) emphasise the importance of adjusting working capital for changes in business activity, e.g. seasonal movements. This provides equilibrium between inflow and outflow of cash. The above-mentioned indicators highlight the potential for, or a deterioration of, working capital, which together with problems related to debt may cause financial problems for the enterprise.

3.4.16 NCTA to number of employees

This ratio does not contribute to the financial analysis *per se*, but does provide a general idea of the amount of cash flow generated by each employee. A useful comparison is to analyse this ratio together with both the **operating income to number of employees** and **the turnover to number of employees**. This comparison may provide some indication of the effective utilisation of the labour force and may suggest a need to address the productivity situation within the enterprise.

3.4.17 [CATA minus preference dividends and minority shareholders' interest] to total shareholders' interest

The relevance of this indicator should be considered from a broad perspective of the enterprise's ability to secure equity capital and generate acceptable returns for shareholders. If the financial position of the enterprise is highly leveraged, it could be more advantageous to look to shareholders to provide additional capital. Ellis and Williams (1993: 189) indicate potential difficulty in raising finance from rights issues. Firstly, the enterprise should evaluate its past rights issues in terms of the amount generated and the time that elapses between the current position and the past rights issue. Secondly, the market may not be conducive to raising new funds for investment. The enterprise may also consider the option of *placing* shares by selling blocks of shares to institutional investors.

However, before accepting any share-offer current and new shareholders would be interested in how successful the enterprise is in achieving an acceptable return on shareholders' capital and paying dividends on a regular basis. The effective use of shareholders' capital for the generation of cash flow from operating activities is ascertained by this ratio, which also refers to the operational efficiency of the enterprise. The result will interest both the shareholders of the enterprise and the debt capital providers. If the ratio is larger than 100% the enterprise is able to add cash to shareholders' capital. A comparison with the traditional **ROE** would provide investors with a perspective on the impact accrual accounting has on the return on total shareholders' interest (Hamman, 1993/1994: 51).

3.5 The relationship between cash flow and traditional performance indicators

The use of cash flow ratios should be seen as a financial performance indicator, which identifies symptoms of a problem and should be analysed further in the context of applicable and comparable traditional financial performance measures. In this section several cash flow ratios are considered together with several comparable traditional ratios discussed in Chapter 2. Research conducted by Smal (1994) illustrates the relationship between several cash flow ratios and their traditional counterparts. A list of cash flow indicators and comparable traditional ratios is provided in Table 3.6.

Table 3.6: A list of comparable cash flow and traditional performance indicators

Cash flow indicators	Traditional performance indicators
Cash flow from operations (after tax)/ turnover	Net income after tax/turnover
Cash flow from total net operating assets	Operating income/ total net assets
Cash flow from total net assets (RONA)	Return on total net assets (RONA) (after tax)
Cash flow from operations (after tax)/ total shareholders' interest	Return on total shareholders' interest (ROE) (after tax)
Cash flow from operations per share	Earnings per share
Interest coverage ratio	Interest cover (EBIT/interest paid)
Dividend cover	Dividend cover

Sources: Smal, 1994: 11 and Hamman, 1993/994: 51.

In order to determine whether or not the cash flow and traditional performance ratios could be related to one another, and what the strength of the relationship would be, enterprises within particular JSE classified sectors are used as the basis for the study by Smal (1994). The results indicate that the interest coverage ratio of the cash flow and traditional approaches achieved the highest coefficient of determination (R^2). The coefficient (R^2) expresses the amount of common variance between two variables and is the square of the product-moment correlation between two variables such as cash flow interest coverage and traditional interest coverage ratios (Statsoft, 1998). Cash flow to total shareholders' interest achieved the lowest coefficient of determination in two of the sectors. Smal (1994: 14) concluded that the results differ from sector to sector, but there are similarities and differences between certain of the traditional and cash flow financial indicators within sectors. Hamman (1993/1994: 51-52)

highlights these similarities and differences by providing the following general synopsis of cash flow and traditional indicators of financial performance:

- Several traditional and cash flow indicators are directly comparable, such as RONA, while cash flow return on sales will track traditional return on sales (ROS).
- A comparison of traditional ROE and cash flow ROE will highlight the effect of accrual-based accounting on an analysis of these indicators.
- Several ratios such as operating cash flow per share could be used as an alternative to traditional EPS.
- Cash flow interest cover is a more appropriate measure than traditional interest cover due to accrual accounting, while cash flow dividend cover would supplement traditional dividend cover for the same reason.

3.6 The relationship between cash flow and the effect of inflation

The effect of inflation has several cash flow implications for both the enterprise and its shareholders. It is possible to distinguish between issues that relate to total shareholders' interest, taxation and interest payable (Brown, 1995: 9-10). The effect of inflation on each of these figures is discussed briefly.

The first issue highlights the inability of historic cost accounting to ensure the maintenance of real financial capital attributable to shareholders. Besides the issue surrounding attributable earnings, inflation also causes reported earnings to be less than the anticipated payout, which results in cash flow implications that may be to the detriment of the enterprise.

The payment of taxes on historic cost income and not on real financial capital causes the state to, in effect, confiscate a portion of the shareholders' capital in the form of undistributed income. The shareholders' funds, the current inflation rate and applicable tax rate determine the direct cash flow implications. The practicality of this situation is a reduction in the cash flow available for shareholders and a further reduction in the return shareholders would expect to achieve due to a decrease in reserves. This situation further depends on the dividend policy, growth potential and business strategies of the enterprise.

In addition, the deduction of the full interest expense, including the inflation premium, when calculating taxable income is also an issue. This situation actually benefits the entity and indirectly the shareholders at the expense of the state and could be regarded as a form of interest subsidy. The cash flow implications are determined by the size of interest-bearing loans, the inflation rate and the enterprise's tax rate. In other words, shareholders are in a better position due to this "oversight" which results in more available cash for distribution to shareholders.

The apparent apprehension of many CI and LI enterprises to indicate the effects of inflation on both traditional and cash flow results is emphasised by the following finding in a survey conducted among persons who compile financial statements. The survey determined that in order to overcome the effects of inflation in financial reporting, with specific reference to cash flow, preference for providing a cash flow trend both in nominal and real terms over a number of years is suggested (Brown, 1995: 156).

3.7 A critical evaluation of cash flow performance measurement

The objective of this section is to use a critical analysis in order to determine which cash flow ratios would be representative of this group of indicators and be suitable for inclusion in the analysis conducted of the CI and LI enterprises during the upswing and decline phases of the economic cycle in Chapters 7 and 8. The process starts with a review of relevant literature and research conducted by authors who use cash flow performance indictors to measure financial performance. The following part of the process involves an application of qualitative criteria to various cash flow indicators. This procedure involves an initial pre-sifting process to eliminate indicators which do not conform to several general evaluation criteria. Those indicators, which remain after the initial selection stage, are subjected to specific qualitative evaluation criteria. The manner in which the evaluation criterion is best expressed by the performance indicator is determined by assigning a "score" to each criterion in order to quantify the process of selecting the most appropriate indicators. In addition, the limitations of the process are highlighted. Finally, several critical pointers related to financial performance measurement are emphasised in order to conceptualise the use and application of cash flow indicators.

3.7.1 Relative importance and usefulness of cash flow performance indicators: Literature review

It appears that research regarding the measurement potential of cash flow indicators is limited, because the emphasis in the literature is more qualitative-based analysis of issues related to cash flow structure and movements. Although cash flow analysis in its current form could still be regarded as being in its infancy, the majority of the indicators highlighted in Table 3.6, which is a synthesis of several research studies and texts over the five years preceding 1997, form the basis for the identification of appropriate and relevant indicators. From the literature, it appears that the status of cash flow as a means to measure financial performance is regarded as a contemporary issue, which requires continuous analysis and debate.

Research suggests that enterprises still prefer the traditional approach to financial performance measurement that emphasises profitability and growth. Cash flow is therefore not often reported externally as a measure of financial performance (Bosch and Du Plessis, 1994: 11). Furthermore, Kroll (1996: 17) also suggests that listed companies, which still prefer to emphasise growth and profitability, often neglect cash flow analysis.

It is possible to distinguish between the usefulness of cash flow performance indicators based on the manner in which they relate to the measurement of four cash flow-based activity areas (see Table 3.5). From the list of cash flow indicators mentioned in Figure 3.1, cash flow to number of employees and cash flow to net income after tax are excluded as primary indicators before the pre-sifting phase. The latter indicator is excluded because it only highlights the effect of accrual-based accounting on earnings as it relates to cash flow, but does not focus on a specific measurement aspect of the enterprise's operations. The former indicator is related to productivity and should be analysed over time as an aspect which may affect an enterprise's ability to generate acceptable levels of cash flow.

In order to achieve an acceptable level of consistency during an analysis of cash flow performance, a two-stage process is used to assess the specified cash flow indicators. Stage one relates the indicator to a particular performance measurement aspect of the enterprise, while stage two is a broader classification based on the whether the indicator could be classified as either sufficient or efficient. The sufficiency indicator should be considered in a

broader context. It measures the adequacy of cash flow to meet both the short- and long-term obligations of the enterprise and highlights the internal cash flow position with regard to investment and other activities. An efficiency ratio highlights the profitability and operations of the enterprise, while emphasising the use of capital. Table 3.7 presents a number of cash flow indicators considered previously in this chapter. Each indicator is assigned a particular classification measure, while in a broader context, where appropriate, an indicator can also be classified as being sufficient or efficient.

The sources used to conduct an analysis of cash flow indicators are obtained from an extensive review of the Business Periodicals Index, a worldwide database, which consists of titles of all recognised journal articles. In addition, ISAP, which contains journal articles published in South Africa, is also sourced for relevant literature titles. Different combinations of key words are used to highlight the particular reference section in the database. Once a section is selected, the titles of the articles are scanned together with key words indicated in the "subjects covered" portion of the particular reference. Those articles, which are potentially considered to be relevant to the research, are sourced and their information content analysed for use in the text. In addition, several financial texts are also sourced and, where possible, the latest editions are used to complement the journal articles.

Table 3.7 indicates that four ratios refer to operations, four to coverage, two each to solvency and profitability and one each to capital and financial investment. The other classification measures highlight one indicator per category. In terms of the broader classification, eight sufficiency and nine efficiency cash flow indicators are highlighted from the analysis. The cash flow (before tax) to net income before tax ratio is not classified, while the latter ratio together with the growth in cash flow from operating activities and cash flow PE ratios are not labelled as efficient or sufficient. Growth complements the sufficiency and efficiency of the enterprise, while price to cash flow per share is a market-related indicator and is based on investor perception. Cash flow (before tax) to net income before tax does not measure a particular aspect such as operations or profitability of cash flow performance, but highlights the effects of accrual-based accounting on enterprise earnings.

Table 3.7: An indication of the measurement attributes of various cash flow performance indicators

Indicator	Classification measure	Sufficient or efficient
Growth in cash flow from operating activities	Growth	----------
Cash flow to ordinary dividend payments	Coverage	Sufficiency
Cash flow to turnover	Operations	Efficiency
Cash flow to interest payments	Coverage	Sufficiency
Cash flow to number of issued ordinary shares	Cash flow	Efficiency
Cash flow to total debt	Solvency	Sufficiency
Cash flow to [gross non-current assets and net current assets]	Investment (cap.)	Sufficiency
Price per share to cash flow per share	Investment (fin.)	----------
Cash flow to current liabilities	Liquidity	Sufficiency
Changes in working capital cash flow to [cash flow from total activities ± changes in net working capital]	Operations	Efficiency
Cash flow to number of employees	Operations	Efficiency
Cash flow to total net operating assets	Profitability	Efficiency
Cash flow to total net assets	Profitability	Efficiency
Cash flow to total shareholders' interest	Solvency	Efficiency
Cash flow to cash flow from capital and financial investments	Intern. funds flow	Sufficiency
Cash flow to net income after tax (earnings)	Operations	Efficiency
Cash flow to capital redemption	Coverage	Sufficiency
Cash flow to [long-term debt repaid + fixed asset purchases + total dividend payments]	Coverage	Sufficiency
Cash flow (before tax) to net income before tax	Non-classified	----------

Sources: Lambrechts, 1992; Giacomino and Mielke, 1993; Hamman, 1993/1994 and 1994, and Schmidgall *et al.*, 1993.

3.7.2 An application of evaluation criteria to cash flow performance indicators

Several qualitative selection criteria are formulated in this section in order to conceptualise the use and measurement potential of cash flow performance indicators. These criteria are also applied to the traditional performance indicators in Chapter 2 (see section 2.8.2). In Chapter 4 the process is reversed and the indicators are applied to the qualitative criteria to highlight the overall significance of analytical issues related to value performance (see section 4.6.3). In order to contextualise the use of the evaluation criteria, it is possible to propose two general criteria as part of a "pre-sifting" process to determine the relevance of cash flow performance indicators for inclusion in further analyses.

- Cash flow performance indicators which have a *limited scope*, or are specific regarding information content are excluded from further analysis. This implies that the excluded ratios could be used to provide a more in-depth analysis of the symptoms identified by more general cash flow performance indicators. For instance, if the cash flow to total debt, which in this case is regarded as a general performance indicator, is lower than in previous years, it would be necessary to analyse specific ratios such as cash flow to long-term debt and cash flow to current debt in order to determine whether the problem is of a short- or long-term nature. The latter indicators could be used to enhance the performance measurement process, but are not included due to their specific focus on categories of debt and not the application of total debt.
- Cash flow performance indicators which *duplicate* the measurement of a particular aspect of the enterprise's financial position. This situation requires an elimination of indicators that are highly correlated and reduce the effectiveness of financial performance measurement. This could imply that relevant ratios might be excluded as part of a selection of performance indictors due to the inclusion of two ratios, which cause duplication of performance measurement. For instance, it is possible that ratios such as cash flow to [gross fixed assets and net current assets] and cash flow to gross fixed assets measure similar investment aspects of the enterprise. The difference between the two indicators refers primarily to the generation of cash flow from net current assets. In this case the former ratio would be considered as a possible performance indicator due to its more general nature of analysing the cash generated from fixed and net current assets.

The following reasons are highlighted for the exclusion of ratios mentioned in Table 3.7 during the pre-sifting phase. Cash flow to ordinary dividend cover already forms part of the more general coverage ratio which is included in Table 3.7. Cash flow to interest payments, which is also a coverage ratio, is more specific to the utilisation of debt capital. It would be useful to first analyse the general coverage ratio and then more specifically the interest coverage ratio, if required. Price per share to cash flow per share is more specific and related to investment analysis. Cash flow to current liabilities highlights the liquidity position of the enterprise and is more focused in terms of its relevance for performance measurement and is therefore not included. Changes in working capital cash flow to cash from total activities is to

some degree addressed by the reinvestment ratio. The cash flow to number of employees is more of a productivity indicator and could be used in order to understand the symptoms related to a reduction in cash flow from operating activities.

Cash flow to total net assets (operations) is already addressed in the more general cash flow to total net assets ratio, which reflects the overall returns generated by management. If the aim of the analysis is to emphasise the importance of operations, the total net assets (operations) would be considered appropriate. In this instance, the focus of this ratio is too narrow for inclusion as an individual indicator to measure the overall performance of cash flow returns. The cash flow to net income before and after tax highlights the limitations associated with traditional earnings. These indicators emphasise the effects of accrual-based accounting and as a result do not directly or specifically contribute to cash flow performance measurement. Cash flow to capital redemption emphasises the short-term ability of the enterprise to meet its debt repayments. However, this indicator is more specific and is not included due to the overall approach to the analysis of cash flow performance.

After applying the above general criteria to the list of cash flow indicators mentioned above, it is possible to formulate more specific criteria for evaluating the adequacy of cash flow performance indicators not eliminated during the initial pre-sifting phase. The aim of this stage of the process is to identify those cash flow indicators which provide a more general orientation of financial performance measurement and conform to an arbitrary minimum requirement of 50% (five out of a possible ten points) for each of the proposed evaluation criteria developed and also applied in Chapter 2, but adapted for the purposes of this section. The following qualitative criteria focus on the need for the financial performance indicator:

1. to contribute to, and enhance *traditional performance analysis* and complement *value analysis*;
2. to be internally consistent by *highlighting* or complementing the *primary goal* of financial management, which is the maximisation of shareholder wealth through the creation of value;
3. to reflect *continuity* in the use of the indicator in the measurement and analysis of financial performance. The cash flow indicator highlights the enterprise's ability to continue

functioning despite short- and long-term changes which occur in certain financial items as reflected by the operations of the enterprise;

4. to highlight the ability of the enterprise to maintain overall *financial stability*. The cash flow indicator would reflect stability despite strategic changes and decisions, which have significant financial implications for the enterprise's performance and competitive position;
5. to *emphasise the efficiency* of the enterprise's business activities over the short and long term and as a consequence enhance management's intentions and ability to grow the enterprise;
6. to be *autonomous* as an indicator of financial performance. In other words, the indicator is not regarded as a means to an end, but as an indication of overall financial performance;
7. to highlight the *sufficiency* of the enterprise's financial performance to meet its obligations and provide adequately for its economic investment and financial needs.

Table 3.8 provides an analysis of several cash flow performance indicators which were not eliminated during the pre-sifting phase. These indicators are subjected to the pre-determined qualitative criteria. A "score" is allotted to the performance indicators based on an application of each individual evaluation criterion. The indicators are then ranked based on their average score. In order to illustrate the process of scoring and application of each criterion to the performance indicators, the **cash flow to total shareholders' interest** is used as an example. The same procedure is applied to the other identified cash flow performance indicators.

Table 3.8: Scores applicable to a selection of cash flow performance indicators after the application of the proposed evaluation criteria

Performance indicator	Criteria							Average Score
	1	2	3	4	5	6	7	
Cash flow to cash flow from total economic and financial investments **(cash position indicator)**	10	9	10	9	6	10	10	**9,14**
Cash flow to total net assets **(return)**	8	9	10	10	10	10	6	**9,00**
Cash flow to [long-term debt repaid + asset purchases + total dividend paid] (**coverage** or adequacy)	8	8	10	9	5	10	10	**8,57**
Cash flow to total shareholders' interest **(return)**	10	10	8	8	9	8	6	**8,43**
Cash flow to number of issued ordinary shares	10	9	9	6	8	9	7	**8,29**
Cash flow to [gross non-current assets and net current assets] **(re-investment ratio)**	7	7	8	8	10	9	8	**8,14**
Cash flow to total debt	9	7	8	6	5	8	9	**7,43**
Cash flow to turnover **(cash flow margin)**	5	7	8	8	10	8	5	**7,29**
Growth in cash flow from operating activities	10	7	6	5	5	5	6	**6,29**

Note: Each criterion, which is applied to the performance indicator, is allotted a score out of 10 as indicated in the table. The average score is determined by the summation of the individual scores divided by the number of criteria. The following "score" classification may be a useful guide to assess the relevance of the indicator in terms of each evaluation criterion: 5-6 Adequate; 7-8 More appropriate; 9-10 Important.

Cash flow to total shareholders' interest, if compared to traditional ROE, could give the investor a good indication of the impact of accrual-based accounting on the return on invested equity funds. The "score" allocated is based on the ability of the ratio to enhance the measurement of shareholder returns by indicating additional insight into the measurement of performance and not just a direct comparison between the cash flow and traditional indicators [score 10]. The cash flow to total shareholders' interest indicator offers a general perspective of the cash flow generated by shareholder funds. The ratio benefits all shareholders as a consequence of the efficient use of equity capital and therefore enhances the maximisation of shareholder wealth [score 10].

Fluctuations in the cash flow return to total shareholders' interest requires management to indicate to shareholders over time that the enterprise continues to function and strive to achieve the governing objective of maximising shareholder value despite temporary cash flow shortages which are caused by apparent changes in the enterprise's normal operations. This

indicator therefore provides an indication of the use of shareholder funds as it relates to maintaining continuity in the short term due to fluctuations in cash flow [score 8]. Although this cash flow indicator does not consider the utilisation of debt capital, it highlights the potential risk for shareholders if appropriate financial leverage is not applied. Shareholders would obtain insight into the possible need for additional funding to "prop-up" cash flow should this shareholder return indicator highlight unsatisfactory returns after the implementation of strategic financial decisions [score 8]. Cash flow to total shareholders' interest could be regarded as an efficiency ratio, which is analysed over time. This could indicate the manner in which cash is generated from shareholder funds. Fluctuations which may occur in equity capital of this ratio, would further indicate management's intention to use available funds and the resulting cash flow to grow the enterprise over the long term [score 9].

This indicator has a certain degree of autonomy in so far as it highlights the use of the funds supplied by a stakeholder group. However, when determining the cash flow return on total shareholders' interest, it is also necessary to analyse cash flow to long-term debt in order to analyse the gearing of the enterprise and the potential effect on cash flow performance of all long-term capital [score 8]. As a first-level analysis the cash flow return indicator highlights the cash-generating ability of shareholder funds. However, as a sufficiency measure the return ratio provides a limited indication to shareholders of the expected payout which they may receive, but enhances the enterprise's potential to either maintain or possibly increase the dividend payout [score 6].

The results in Table 3.8 indicate that ratios which provide a more general indication of cash flow performance obtain the highest average score. These ratios which obtain an average score of more than 8,50 out a possible ten include the cash position indicator (9,14), cash flow return on total net assets (9,00) and the coverage ratio (8,57). These three cash flow indicators could be considered as mainstream indicators, while it may be appropriate also to analyse the following three indicators, i.e. cash flow return on total shareholders' interest (8,42), cash flow to number of ordinary shares issued (8,28) and the re-investment ratio (8,14), which also obtain an above average score. Cash flow to total debt (7,42), cash flow to turnover (7,28) and growth in cash flow from operations (6,28) obtain lower average scores.

Additional cash flow indicators that do not form part of the selected group should be used to complement and supplement the main stream indicators in terms of specific measurement applications. These indicators include those that refer more specifically to aspects of operations, coverage, financial and capital investment, solvency and profitability.

The limitations of this evaluation process are the same as those highlighted in Chapter 2 and are therefore not discussed in detail in this section. It should be re-emphasised that this approach has a qualitative decision-making base with arbitrary score allocation. Therefore the analysis of cash flow performance indicators should be considered in the context of the conceptual nature of the approach, the objectives of the performance measurement process and the identification of a representative group of cash flow ratios for use in the statistical analysis of the CI and LI enterprises over an upswing and decline phase of the economic cycle conducted in Chapters 7 and 8.

3.7.3 Specific issues related to cash flow performance measurement

In order to obtain a clear perspective of the use and application of cash flow performance indicators, an analysis of specific issues is required. These issues are highlighted by emphasising two primary aspects of cash flow performance analysis, i.e.

- The enhancement of financial performance measurement by using cash flow indicators;
- A limited understanding regarding the relevance of cash flow performance measurement.

3.7.3.1 The enhancement of financial performance measurement by cash flow indicators

The measurement of cash flow performance is an interdependent analysis of indicators which consider the flow of funds in the enterprise and further provide a second-level and more refined analysis of financial performance measurement than the traditional performance indicators discussed in Chapter 2.

Cash flow indicators should enhance, not replace, traditional performance indicators. Limitation related to traditional earnings should be emphasised by referring to cash flow indicators of particular relevance, which may assist management to overcome problems related to traditional performance analysis. Although cash flow performance indicators are

based on past performance, it would be useful to identify those indicators which are either directly comparable, indicate the effect of accrual-based accounting (earnings), could be used as an alternative to traditional indicators, or are more appropriate than individual traditional performance indicators as highlighted in section 3.5.

More information is embodied in the cash flow indicators about management's business intentions. For example, an analysis of the cash flow coverage (adequacy) ratio, the cash position indicator and the cash flow return to total net assets would provide an indication of the enterprise's ability to manage and generate cash flow from operations. Traditional performance analysis often allows managers to add "window dressing" to the results, which endorses a more favourable financial performance, if compared to a cash flow analysis of the enterprise's financial position.

A combination of traditional and cash flow performance indicators such as those identified in section 3.5.2 and Chapter 2 should largely facilitate fundamental analysis and supplement both economic and financial investment decision-making. Cash flow indicators as such do not form part of value-added analysis, but the future expected free cash flow (after tax cash flow from operations minus incremental investment) which is discounted at the cost of capital, provides an indication of value creation.

3.7.3.2 A limited understanding regarding the relevance of cash flow performance indicators

The emphasis in the research literature is placed on the information content and systematic use and analysis of the various cash flow statement components. In contrast, cash flow performance measurement raises certain issues concerning the relevance, usefulness and "value-added" contribution of cash flow performance indicators. Limited attention is given to the identification of several specific indicators and their relevance for financial performance analysis.

Although all companies are required to submit cash flow statements as part of their annual financial report, financial performance analysis is highlighted by the lack of relevant cash flow indicators. The emphasis is primarily on traditional earnings and dividend per share growth.

A process is required to highlight the consequences of cash flow and sensitivity of the enterprise to movements in cash flow is required.

The issues mentioned and discussed in the preceding sections indicate that the use of cash flow for financial performance measurement has significant advantages over the traditional approach. However, cash flow performance analysis should not replace traditional analysis, but a shift in emphasis from profitability and growth evaluation is required in order to enhance performance measurement and provide a more realistic assessment of the enterprise's performance over time. A clearer understanding of the relevance and scope of cash flow, especially among private sector enterprises, is required to ensure that shareholders make informed decisions about the fundamentals of the enterprise before considering an investment.

In the context of the cash flow performance evaluation it is suggested that the cash position indicator, the cash flow return on total assets and the coverage ratio should be considered as mainstream indicators. These indicators cover various aspects of the enterprise's cash flow position, which include the operational aspects, the utilisation of total capital and the adequacy of cash flows to meet both short- and long-term obligations. In addition, the following three indicators, cash flow return on total shareholders' interest, cash flow per share and the re-investment ratio, should complement the mainstream indicators. The other cash flow performance indicators as well as those which are used for more specific measurement purposes, should supplement the identified "superior" indicators.

3.8 Summary

This chapter highlights the usefulness, relevance and need for an analysis of cash flow in financial performance measurement. The discussion complements the traditional approach to financial performance measurement discussed in Chapter 2 by emphasising additional financial performance indicators. Furthermore, an analysis of cash flow supplements the traditional approach by offering additional insights into the usefulness and limitations associated with the traditional performance indicators.

The first part of the chapter analyses the concept of cash flow by highlighting the significance of cash flow as a financial performance measure. In addition, various descriptions and

definitions of the concept of cash flow are considered and the differences between cash flow and accounting earnings are emphasised. The second part of the chapter focuses on cash flow performance measurement and analysis. In this section cash flow performance analysis is discussed through an analysis of cash flow and more specifically the identification of cash flow performance indicators. The cash flow analysis relates to the actual inflow and outflow of five cash flow components identified from the cash flow statement. Furthermore, the sensitivity and effect of cash flow movements on financial success and failure are emphasised.

Various cash flow indicators are identified from literature sources and discussed in terms of their information content and usefulness for highlighting financial performance. In addition, the cash flow indicators are classified in terms of their usefulness for enhancing specific activity-based decision-making areas in the enterprise. This activity-based measurement allows a performance analysis of four components based on the primary categories of the cash flow statement, i.e. measurement of operating cash flow performance, measurement of working capital performance, the measurement of management's ability to make fixed asset purchases and acquisitions and the analysis of the short- and long-term financing position of the enterprise.

The need to determine the association between cash flow performance indicators and, where possible, traditional performance indicators are also highlighted. In this context it is useful to identify those cash flow ratios which are either directly comparable, indicate the effect of accrual-based accounting (earnings), and could be used as an alternative to traditional indicators or are more appropriate to use than traditional performance indicators highlighted in Chapter 2.

The final section of the chapter offers a critical evaluation of cash flow performance measurement. During the first part of this section the relative importance of cash flow performance indicators is determined by a synthesis of information obtained from several literature sources. The indicators are initially classified by financial performance measurement area such as profitability, coverage or operations. A broader analysis of the cash flow indicators is also suggested, which distinguishes between cash flow indicators on the basis of their sufficiency or efficiency. From the analysis it is possible to distinguish between eight sufficiency and nine efficiency ratios.

The application of pre-determined qualitative criteria to various indicators that remain after the pre-sifting phase highlights the importance of using more general cash flow indicators for performance measurement. The results of the qualitative procedure indicate that the cash position indicator, cash flow return on total net assets, and the coverage ratio should be considered as mainstream performance indicators. Cash flow return on total shareholders' interest, cash flow per share and the re-investment ratios are additional indicators which should supplement the three mainstream indicators. The other indicators such as cash flow to total debt, cash flow to turnover and growth in cash flow from operations could complement cash flow performance measurement.

The cash flow indicators which do not form part of the primary group should be used to further enhance the symptoms identified by the mainstream indicators. These additional indicators include those that refer to more specific aspects of operations, coverage, financial and capital investment, solvency and profitability. Cash flow performance indicators enhance financial performance analysis by providing additional insight for the measurement of financial performance. However, cash flow performance analysis is generally not favoured by private sector enterprises when highlighting financial performance, at least not outside the enterprise. This may be primarily due to the disparity between commendatory results based on traditional earnings and the sensitivity of financial performance, which is often reflected by the analysis of cash flows.

In retrospect, the baseline measurement of cash flow is past performance, which also forms the framework for this discussion. However, a forecast of the after-tax cash flow from operations which could be used together with other determinants of value is discussed in detail in Chapter 4. The cash flow performance indicators discussed in this chapter are calculated for the CI and LI enterprise groups for both the upswing and decline phases of the economic cycle (see also section 5.3 of Chapter 5). The behaviour of the selected ratios are statistically analysed and investigated over the duration of the identified upswing and decline phases of the economic cycle in Chapters 7 and 8.

CHAPTER 4

THE USE OF VALUE INDICATORS FOR FINANCIAL PERFORMANCE MEASUREMENT

4.1 Introduction

Various perspectives on value have developed over the years. These range from value perceived by consumers to the use of value as a motivator of employee performance. In addition, value is also regarded as a platform for change in which stakeholders of the enterprise are inclined to buy into a process of value performance measurement (Guaspari, 1995: 46). Value performance measurement could indirectly be related to the organisational structure and may further create an understanding of why people invest in a particular enterprise. More specifically, economic and market value added are measures which are regarded as the true test of corporate performance (Stern and Hahn, 1995: 30). However, financial value is an indicator that is determined by, among other things, an analysis of both traditional (Chapter 2) and cash flow (Chapter 3) performance.

Chapter 4 forms part of a section in the study that considers various categories of performance indicators for measuring financial performance. This section also includes Chapters 2 and 3, which highlight traditional and cash flow performance indicators respectively. Value assessment indicators discussed in this chapter could also be regarded as an extension of financial performance analysis by considering various aspects and indicators covered in previous chapters.

This chapter consists of four parts. Part one focuses on the concept and relevance of shareholder value. The emphasis is placed on the significance of value and the importance of several financial determinants related to value creation. Part two provides a discussion of the shareholder value approach, both theoretically and by means of a practical illustration. In addition, the relationship between sustainable growth and ROE together with other value determinants is emphasised and the primary effect of growth on value creation for several

hypothetical enterprises is highlighted. The latter analysis is provided to further enhance the theoretical understanding of the effect of different growth rates on the ability of the enterprise to create value or alternatively destroy value. An analysis of several value-creation indicators is provided in part three. Also in this section, a short evaluation of the operational value added statement is provided. The final part is a critical evaluation of value-added performance measurement. This section emphasises the relative importance of value assessments, the use of value indicators and an evaluation of the information content of several value assessment indicators. Furthermore, an analysis of proposed evaluation criteria and the identification of several key pointers of the value approach to financial performance measurement are also considered in this section.

4.2 The concept and relevance of value creation

Before analysing the financial aspects of value added (often also termed creation), a broader perspective of value is required in order to understand the wealth created by the interaction of various economic units within the economy. The concept of value is not a new development in financial theory. Besides, value is more often related to other research disciplines such as customer value and employee value. In order to determine the wealth created by the economy, it is necessary to analyse the economic performance of each and every unit such as individuals, enterprises and the government that exchanges services and products to their mutual benefit (Owen, 1994: 380).

Several categories of contributors to and beneficiaries of wealth are found in an enterprise or economic unit:

Contributors and Beneficiaries	Stakeholder group
Employees (provide physical and mental effort)	Internal
Providers of debt capital	External
Providers of physical capital	External
Government (provides infrastructure to underpin the wealth-creation process)	External
Providers of equity (permanent) capital	Internal

The wealth created by a CI or LI enterprise during an upswing and decline phase of the economic cycle could be defined as the increase in market value resulting from the alteration of form, location or the availability of a product or service, excluding the cost of bought-out

goods and services (Owen, 1994: 381). Market value and costs are determinants of value and form the basis for wealth creation in the enterprise. The value added could be described as the trade-off between the return for, and cost to, any of the contributors or beneficiaries mentioned above.

However, the primary focus of value creation in this chapter is on the financial domain and therefore the emphasis is placed on the need for management to create and analyse value for its shareholders. The need for the enterprise to create value is emphasised in the literature by several authors such as McTaggart, Kontes and Mankins, 1994; Fruhan, 1979 and 1991; Arzac, 1991; Blyth, Friskey and Rappaport, 1986 and Rappaport, 1981 and 1986. Despite the prominence accorded to value creation in the literature, limited published material exists on the current use of shareholder value management (Fasol and Firer, 1995). Coopers and Lybrand-Deloitte (1991) commissioned a survey that assessed the current use of shareholder value principles by management in the United Kingdom. The study found that top management frequently uses shareholder value measures for major business decisions. In addition, two thirds of the companies in the research sample use the concept of shareholder value, while only one in six use it for planning and reporting purposes. The study further suggests that shareholder value measures would become important for management purposes in the future.

Value is also often analysed from a strategic perspective and generally relates to the ability of management to integrate market economics, competitive position and use financial determinants to indicate whether or not value is created or destroyed for shareholders. Fruhan (1979: 7) suggests that value is created for shareholders when the enterprise undertakes strategic investments that produce returns that exceed the cost of the investment. Figure 4.1 illustrates the various financial determinants of value and how they are related to determine value creation. These financial determinants which include cash flow, return on total shareholders' interest (ROE), return on capital employed (ROCE), weighted average cost of capital (WACC) and cost of equity (K_e) are subsequently discussed.

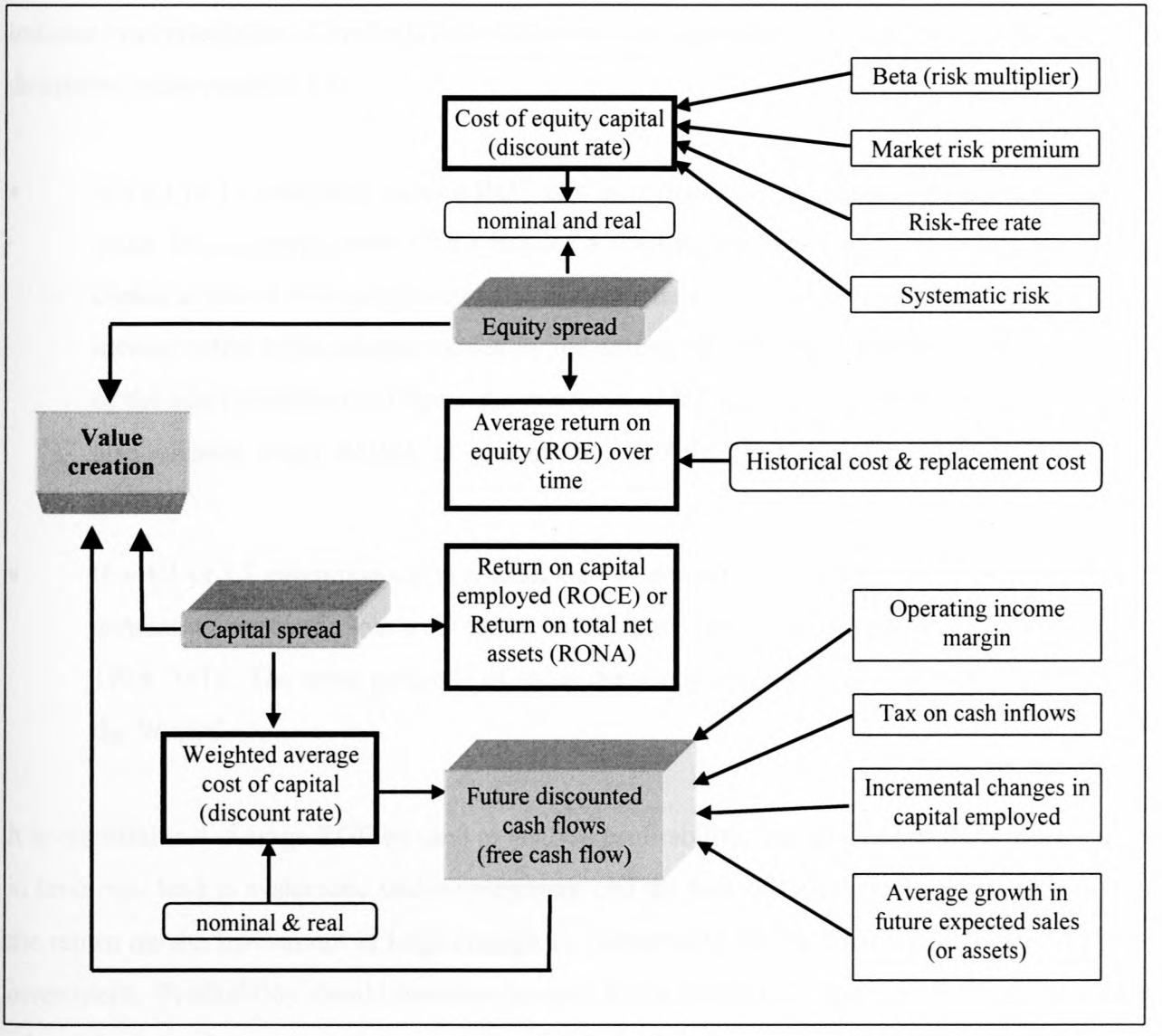


Figure 4.1: The financial determinants of value and value creation (**Source**: Adapted from McCrory and Gerstberger, 1992: 36)

4.2.1 The financial determinants of value and value creation

Value creation is expressed in terms of several key determinants which include the present value of free cash flows (FCF), the expected ROE, the K_e, the expected growth of the enterprise and the period during which the enterprise maintains a positive spread between ROE and K_e (Arzac, 1991: 50). The difference between RONA and WACC indicates whether or not value is added to the total capital of the enterprise.

An enterprise's performance is directly affected by the financial determinants of value and value creation mentioned above and illustrated in Figure 4.1. McTaggart *et al.* (1994: 78)

indicate two principles of profitability which are used to analyse financial performance and determine value creation, i.e.

- If a CI or LI enterprise earns a ROE that is consistently greater that its K_e, it creates value for its shareholders. This implies a consistent generation of economic income during either or both an upswing and decline phase of the economic cycle. Economic income refers to the income earned by the enterprise over and above the monetary cost of the equity required to finance its operations (McTaggart *et al.*, 1994: 341). Value is also created when RONA is greater than WACC, but this depends on financial gearing.
- If a CI or LI enterprise earns a ROE that is consistently lower than its K_e, thereby generating economic loss over time, shareholder value is destroyed (McTaggart *et al.*, 1994: 341). The same principle of value destruction applies when RONA is less than the WACC.

It is essential that average ROE be used to analyse profitability. An analysis of ROE at a point in time may lead to systematic under-investment and the loss of long-term benefits, provided the return on the investment is large enough to compensate for the financial sacrifice of the investment. Profitability should therefore be seen in the context of value creation and the use of traditional performance indicators such as ROE and RONA, discussed in Chapter 2.

4.2.1.1 Cost of total and equity capital

The cost of capital (also generally referred to as the discount rate) may vary among CI and LI enterprises and is caused by differences in business risk and/or financial risk. Business risk refers to the degree of forecast uncertainty that investors perceive concerning the enterprise's future operating cash flow, which cannot be offset by diversified investment and other securities (McTaggart *et al.*, 1994: 308). Financial risk is the additional risk caused by the enterprise's use of leverage financing and the risk carried by the shareholders.

The overall cost of capital, or WACC, consists of several components that relate to the long-term financing of an enterprise's assets. These components are the cost of debt (after tax), cost of preference shares (after tax), cost of ordinary shares (after tax), and newly issued

shares. In mathematical notation WACC is illustrated in the form of the following equation and is expressed as a percentage (adapted from Lambrechts, 1992: 307):

$$WACC = w_dK_d(1 - t) + w_pK_p + w_sK_s + w_nK_n \quad (1)$$

Where: K_d is the cost of debt (after tax)

K_p refers to the cost of preference shares (after tax)

K_s implies cost of ordinary shares (after tax)

K_n indicates the cost of newly issues shares (after tax)

(1–t) refers to a before or after tax calculation

w_d, w_p, w_s, w_n are weights assigned to each cost component.

The focus in this section is on K_e due to the emphasis placed on the creation of shareholder value and the importance of utilising shareholder capital in a relevant and appropriate manner by management.

The K_e can be calculated, inter alia, by using the capital asset pricing model (CAPM). This approach is well documented in the literature and is represented in various texts as a method for calculating the cost of equity (Fruhan, 1979; Samuels *et al.*, 1990; Myddelton, 1995 and McTaggart *et al.*, 1994). In essence the CAPM refers to the sum of a risk-free rate for an investment (an adequate proxy is the long-term government stocks or gilts) plus the market risk premium, which is multiplied by a coefficient (*b*) which represents the level of risk assigned to the share of a particular enterprise. The risk coefficient or beta coefficient is generally determined from the standard deviation of the enterprise's share returns. The systematic risk for a publicly traded share may be estimated from its (*b*), which is also known as the risk multiplier (McTaggart *et al.*, 1994: 309). The market risk premium is generally regarded as the difference between the expected return or the investors' required return on the investment (R_m) and the risk-free rate (R_{rf}). This premium typically expresses the enterprise's risk in relation to the overall market. Equation (2) expresses the K_e in terms of the preceding elements:

$$K_e = R_{rf} + b(R_m - R_{rf}) \quad (2)$$

Generally, the components of K_e are expressed in nominal or monetary terms, in other words, unadjusted for inflation. Fruhan (1979: 34) suggests that precise estimates should be made of K_e, both in nominal and real terms and that all the elements of the cost of equity be adjusted for inflation. The following practical example of K_e assumes that the risk-free rate (R_{rf}) is equal to 6%, the required rate of return (R_m) is 14%, the market risk premium is 8% (14% – 6%) and the beta coefficient (*b*) for the enterprise is 1,08. An enterprise with a beta coefficient of larger than one has a higher risk level than an enterprise with a beta coefficient of less than one. Cost of equity is calculated as follows by using equation 2:

$$K_e = R_{rf} + b(R_m - R_{rf})$$
$$K_e = 6\% + 1.08 \times 8\%$$
$$K_e = 14{,}64\%$$

However, if a 10% inflation rate is assumed, the real K_e would be approximately 4,64%. In addition, K_e is also equal to the bond yield plus the market risk premium (Fruhan, 1979: 33 and Ellis and Williams, 1993: 333).

4.2.1.2 Return on total shareholders' interest (ROE) and return on total net assets (RONA)

The relevance of traditional ROE and RONA is mentioned in Chapter 2 as a determinant for calculating value. These indicators, together with K_e and WACC respectively, are used to determine whether or not value is created or destroyed. The RONA (after tax) refers to the use of an enterprise's productive assets and is calculated by expressing EBIT (after tax) as a percentage of the enterprise's total (operating) assets. Traditional ROE (after tax) for a given financial year is calculated by net income after tax divided by the average total shareholders' interest (Lambrechts, 1992: 96). ROE can also be calculated by using RONA, the tax rate, cost of debt, book value of debt (BVD), book value of equity (BVE) and the interest rate (r) after tax. The following equation is expressed in terms of the aforementioned value determinants (adapted from Arzac, 1991: 52):

$$ROE = RONA + \frac{BVD}{BVE}(RONA - (1-t)r) \quad \text{.....(3)}$$

The preceding equation is based on historical cost accounting and therefore does not make provision for inflation or any other adjustment. Fruhan (1991: 30) suggests that ROE should be calculated using replacement cost rather than historic cost accounting principles. The ROE-adjusted figure is lower as a result of higher depreciation charges, which is caused by the higher replacement cost of net fixed assets. A larger denominator (BVE) also affects the ratio when equity is reduced by larger losses. The traditional ROE formula could be adapted and re-calculated as [EBIT – (replacement cost depreciation – historical cost depreciation) – cost of sales adjustment] divided by [average total shareholders' interest].

4.2.1.3 The capital and equity spread

The capital and equity spread are indicators of value creation or destruction. An indicator such as the capital spread is defined as the difference between the RONA and WACC, while the equity spread is the difference between ROE and K_e. These measures provide an indication of the enterprise's ability to discriminate between adequate and poor growth potential. Both WACC and K_e are also used as a rate for discounting future expected operating and equity cash flows. By using discounted cash flow as point of departure, it is possible to analyse the value-creation potential of an enterprise by calculating the warranted capital value (WCV). The WCV is defined as the future generated operating cash flow, discounted by the WACC (McTaggart *et al.*, 1994: 345).

Although all stakeholders are interested in the ability of the enterprise to create internal value, it is the shareholders that specifically analyse the potential of an enterprise's shares and management's ability to make consistent dividend payouts or cash distributions. In this context the following section refers to the shareholder value approach which is used to determine shareholder value on the basis of free cash flow.

4.3 The shareholder value approach (SVA) to value creation

In order to understand the value-creation potential of an adopted strategy, management need to focus on the three key areas, i.e. operations, financing and investment (Ellis and Williams, 1993: 335). Detailed analysis of the preceding three areas give rise to an approach generally known as the SVA approach, which aims to create value for the enterprise's shareholders by discounting forecasted free cash flows by the cost of equity (Engebretsen, 1992: 50). The

premise of the SVA approach is the cash-generating ability of the enterprise, which in turn provides the opportunity for management to compare the intrinsic value of the share determined by the SVA to the current market value of the share.

Free cash flow (FCF) is not a new concept, but has been used to gauge value creation over a number of years (Brealey and Myers, 1988: 56). Free cash flow is defined as the after tax cash inflow (net operating profit after tax) minus the incremental working capital and fixed investment needs of the enterprise (Blyth *et al.*, 1986: 51-52). The relevance of free cash flow as a measure of value creation is further highlighted by its use for determining economic value. Arzac (1991: 52) also refers to economic value as the present value of FCF discounted by K_e. The operational drivers of FCF are sales growth, operating profit margin and the tax rate. In addition, financing enterprise operations depends on the cost of capital and the investment required to create value, which is generally referred to as the need for incremental working and fixed capital. Dreyfus (1989: 4) suggests that FCF is one of the more appropriate indicators of shareholder value performance measurement.

Value is created when the expected rate of return on incremental fixed capital exceeds the growth potential of the cost of capital (Stern, 1977: 33). Alternatively, growth is realised or value is created when the discounted value of the expected future FCF is greater than the discounted value of a perpetual stream of net operating profit after tax (NOPAT) (McCrory and Gerstberger, 1992: 35).

The shareholder value created by FCF is indicated in absolute terms and therefore a clear distinction should be made between approaches which measure value in absolute terms and indicators of value creation which generally express the result in the form of a percentage or ratio. The SVA approach is illustrated and discussed in the following section and provides an absolute value for an adopted strategy.

4.3.1 A practical application of the shareholder value approach

A practical hypothetical example of an enterprise which uses the SVA is illustrated for the period 1996 to 2000. Table 4.1 illustrates the financial information required to implement the approach, while Table 4.2 provides the calculations needed to determine shareholder value.

The following procedure is used to determine shareholder value (Ellis and Williams, 1993: 334-341 and Blyth *et al.*, 1986):

- Calculate the increase in sales for a given year.
- Multiply the increase in sales by the operating margin and one minus the tax rate in order to determine NOPAT.
- Determine the incremental fixed investment and incremental working capital needs from the expected growth in sales.
- Subtract from NOPAT the incremental working capital and fixed capital needs in order to determine the free cash flow (FCF).
- Discount the free cash flow by the discount rate in order to determine the present value of the free cash flows.
- In order to determine the residual value for a year, capitalise the NOPAT for the year by dividing by the cost of capital. The residual value is the value that the business is assumed to have at the end of the forecast period, which implies that after the forecast period the enterprise could be sold as a going concern.
- Multiply the residual value by the discount rate which is calculated as ([1/(1+cost of capital/100)^{n}]. The discount rate is dependent on the cost of capital and is used to obtain the present value of the residual value.

Table 4.1: A breakdown of data required to apply the SVA approach

Forecast period	**1996**	**1997**	**1998**	**1999**	**2000**
Sales growth rate (anticipated) (%)	15	15	15	15	15
Operating income margin (%)	20	20	20	20	20
Incremental fixed capital (%)	40	40	40	40	40
Incremental working capital (%)	18	18	18	18	18
Cost of capital (%)	14	14	14	14	14
Cash income tax rate (%)	38	38	38	38	38
Number of shares: one million (expected to remain constant)					
The cost of capital: 14%					

Note: Sales at the beginning of 1996 is R2 500 000

Table 4.1 highlights several strategic management decisions that focus on the operations, financing and investment aspects of the enterprise. The sales growth, operating profit margin after tax and the cash tax rate referred to in Table 4.1 form part of the enterprise's operational activities. NOPAT is equal to the expected income from operations multiplied by one minus the expected corporate tax rate.

Management will therefore need to decide what trade-off they wish to pursue in respect of sales growth and profit margin. It may be advisable for an enterprise to analyse past experience in terms of the value created or destroyed for their shareholders. This is also regarded as the pre-strategy shareholder value. If the K_e is larger than ROE, the enterprise should increase margins before setting growth targets because growth manages to destroy value if the K_e is larger than the expected ROE. The K_e, which is a function of the financing decision, depends largely on the ROE as determined by the utilisation of shareholders' interest. K_e represents the rate of return shareholders expect to earn through dividends and capital appreciation by investing elsewhere in common shares of alternative, identically risky securities (Stern, 1977: 32).

The investment decision relies on the incremental working capital and fixed capital needs of the enterprise. Incremental working capital requirements should cover the additional amounts the enterprise needs to invest in stock and debtors less additional credit, while the working capital to sales ratio could be used as an indication of these requirements. The same principle applies to the fixed capital needs of the enterprise (Ellis and Williams, 1993: 337). Table 4.2 provides an illustration of the shareholder value approach based on the information in Table 4.1.

Table 4.2: A calculation of the value created by the enterprise for shareholders

Calculating the future turnover					
Year	Sales previous year (R) **A**	Sales growth rate (%) **B**	Increase in sales (R) **C=A×B**	Total sales for year (R) **D=A+C**	
1996	2 500 000	15	375 000	2 875 000	
1997	2 875 000	15	431 250	3 306 250	
1998	3 306 250	15	495 937	3 802 187	
1999	3 802 187	15	570 328	4 372 515	
2000	4 372 515	15	655 877	5 028 392	
Calculating after-tax cash flow (NOPAT)					
Year	Sales for year (R) **D**	Profit margin (%) **E**	Operating profit (R) **F=D×E**	Tax paid (R **G=F×38%**	After-tax cash flow (R) **H=F–G**
1996	2 875 000	20	575 000	218 500	356 500
1997	3 306 250	20	661 250	251 275	409 975
1998	3 802 187	20	760 437	288 966	471 471
1999	4 372 515	20	874 503	332 311	542 192
2000	5 028 392	20	1 005 679	382 158	623 521
Effect of sales growth on incremental fixed investment and working capital needs					
Year	Growth in sales (R) **C**	Incremental fixed investment (%) **I**	Incremental fixed investment (R) **J=C×I**	Incremental working capital (%) **K**	Incremental working capital (R) **L=C×K**
1996	375 000	40	150 000	18	67 500
1997	431 250	40	172 500	18	77 625
1998	495 937	40	198 375	18	89 268
1999	570 328	40	228 131	18	102 659
2000	655 877	40	262 350	18	118 057
Calculation of the present value of the free cash flows					
Year	Free cash flow (R) **M=H–J–L**	Discount rate (%) **N**	Present value of FCF (R) **O=M×N**	Cumulative present value of **FCF (R)**	
1996	139 000	0,877	121 903	**121 903**	
1997	159 850	0,769	122 924	**244 827**	
1998	183 828	0,674	123 900	**368 727**	
1999	211 402	0,592	125 149	**493 876**	
2000	243 114	0,519	126 176	**620 052**	
Calculating the residual value					
Year	After-tax cash flows (R) **H**	Cost of capital (%) **P**	Residual value (R) **Q=H/P**	Discount rate (%) **N**	Present value of residuals (R) **R=Q×N**
1996	356 500	0,14	2 546 428	0,877	**2 233 217**
1997	409 975	0,14	2 928 392	0,769	**2 251 933**
1998	471 471	0,14	3 367 650	0,674	**2 269 796**
1999	542 192	0,14	3 872 800	0,592	**2 292 697**
2000	623 521	0,14	4 453 721	0,519	**2 311 481**

The figures in Table 4.3 are derived from the calculations in Table 4.2 and are underlined in bold. Other assumptions made include no marketable securities and the book value of debt is R750 000. Assume that the current market price of the enterprise's shares is 229c per share.

Table 4.3: A summary of the value created by management for shareholders

Cumulative present value of cash flows (R)	620 052
Present value of residual value (R)	2 311 481
Marketable securities (R)	0000
Corporate value (R)	2 931 533
Less: Book value of debt (R)	750 000
Shareholder value (R)	2 181 533
Value per share (SVA) (c)	218

The information in Table 4.3 that is derived from the implementation of the shareholder value approach indicates that shareholder value in excess of R2 million is created, which translates to a share price value of 218c per share. An enterprise's financial performance is often measured by share statistics, which makes it useful to gauge the intrinsic value per share in contrast to the current trading value of the share. A comparison of the share price value to the current market price per share indicates that the market price is 5% higher than the share price value. In the context of the business value, the current trading range of the share may suggest that the enterprise's shares are undervalued in terms of market perception (SVA per share < current market price). If the share price value were larger than the current market value, it would appear that the enterprise's shares are overvalued in terms of shareholder sentiment (SVA per share > current market price).

As an extension of the previous case example it is possible to determine whether or not value is created or destroyed by the enterprise. This is accomplished by using the expected rate of return on incremental fixed assets and the cost of capital (required rate of return) as the premise for the calculations. The results are indicated in Table 4.4. Part A illustrates that an income of R21 000 is needed in 1996 to cover the cost of capital, while R36 729 is required in 2000. The required return for 1996 in part B of Table 4.4 indicates that a return of 18% generates R27 000 of income, while value of R6 000 is created. Part C of Table 4.4 clearly

indicates that capital is being utilised in a manner which destroys shareholder value (for example, R4 500 in 1996), despite an income of R16 500.

Table 4.4: Hypothetical analysis of value creation and destruction

A: No value is added or destroyed (cost of capital = 14%)				
Year	**Incremental investment (R)**	**Internal return (%)**	**Income (R)**	**No value is created (0%) (R)**
1996	150 000	14	21 000	0
1997	172 500	14	24 150	0
1998	198 375	14	27 773	0
1999	228 131	14	31 938	0
2000	262 350	14	36 729	0
B: Value is created				
				Value created (4%)
1996	150 000	18	27 000	6 000
1997	172 500	18	31 050	6 900
1998	198 375	18	35 708	7 935
1999	228 131	18	41 064	9 125
2000	262 350	18	47 223	10 494
C: Value is destroyed				
				Value destroyed (–3%)
1996	150 000	11	16 500	–4 500
1997	172 500	11	18 975	–5 175
1998	198 375	11	21 821	–5 951
1999	228 131	11	25 094	–6 844
2000	262 350	11	28 859	–7 871

The shareholder value approach is a useful extension of the previous chapter that discusses issues related to cash flow. It offers a mechanism which uses cash flow to determine intrinsic shareholder value which can be related to market prices. However, it is essential for management to assess the key drivers of this approach in an appropriate manner and make realistic forecasts and assumptions. The need to apply sensitivity analysis for different costs of capital and income margins would further enhance the predictive power of the SVA

approach. In addition, management should be aware of the potential users of the information generated by the approach and emphasise its usefulness in strategic decision-making.

4.3.2 The relationship between sustainable growth and ROE

This section focuses on the relationship between growth and ROE together with the changes that occur in several value determinants and the subsequent effect on value creation and destruction. The focus in the previous section highlights the growth in sales and its affect on the after-tax cash flow position of the enterprise by emphasising discounted free cash flow as a measure of value. Shareholder value analysis is based on determining a business value from which a share price value is calculated. Value is assessed by using the potential return on incremental investment, together with the required return (cost of capital). The hypothetical examples which illustrate the effects of growth in this section use an economic to book ratio to assess value, where the economic value is the discounted free cash flow which forms the basis for value assessment in the previous section. Therefore, the analysis in this section takes a broader look at the effects of growth on value creation.

The research undertaken by Fruhan (1991) and Arzac (1991) suggests that several determinants that affect value creation have certain effects on the relationship between the sustainable growth rate (SGR) and ROE (see also section 2.6.4.2 in Chapter 2). Sustainable growth may refer to growth in various financial magnitudes such as total net assets, total shareholders' interest (net worth) or sales. In addition, growth in total shareholders' interest is also often measured by the retention rate, which refers to the rate at which the enterprise retains income available for distribution to shareholders. The following effects on sustainable growth and ROE are identified, namely:

- SGR minus cost of capital (WACC): A high percentage difference between SGR and WACC ensures that the growth in net worth (and sales) is not consumed by the cost of capital. It is possible that low growth or an increase in net worth would be negatively affected by the cost of equity.
- SGR minus inflation rate: The need to analyse the SGR in real terms is emphasised by the negative effect of inflation on growth. If the inflation rate is the same or higher than the SGR, the growth in sales would be caused by inflation and not the productive use of the enterprise's assets.

- SGR minus retention rate (B): The higher the difference between the SGR and RR the larger the portion of income which can be declared as dividends. This reduces the growth in net worth and causes a lower ROE, which over time may be unacceptable to shareholders.
- ROE minus SGR minus B: If SGR is subtracted from ROE no growth in net worth (and sales) is implied. This subsequently causes a reduction in ROE if income remains constant. However, ROE is further "diluted" if the retained earnings are subtracted from the difference between ROE and SGR. In other words, net worth may not be increasing at the same rate as earnings, which causes a reduction in ROE.
- ROE minus cost of equity: If the difference between ROE and K_e is positive, value is created for the shareholders of the enterprise and subsequently profitability improves. In turn, if the spread is negative, shareholder value is destroyed.
- ROE minus inflation rate: The nominal growth in net worth must be higher than the inflation rate in order to achieve positive real returns. ROE is "diluted" by inflation and is further affected by the accounting approach adopted by the enterprise.

The effects illustrated above highlight the importance of ensuring that the growth in equity should be accompanied by an increase in earnings, which in turn would ensure higher returns for shareholders, provided the cost of equity is also kept below the ROE. Inflation, however, would further serve to reduce returns if growth is negative and cause a reduction in the returns for shareholders. The converse implies that positive real returns could be accomplished if growth in retained earnings is positive and the real K_e does not exceed the ROE.

A more general analysis of changes in value determinants is provided by a discussion of two hypothetical examples that illustrate the effects of growth. The first example in Table 4.4 (a) illustrates the effect of the same growth rate for three enterprises: one which creates value, one which destroys values and another which is neutral (ROE equals K_e). If the economic value is divided by the book value of equity, an economic to book ratio is obtained, which is used as an indicator of value creation. The economic to book ratios and the book value of equity to the market value of equity are assumed, while other determinants are calculated accordingly. Per definition, an enterprise which creates value has an economic to book ratio of lager than one, while an enterprise which destroys value has a ratio of less than one. The second

example in Table 4.4 (b) illustrates the effect of growth on a CI and an LI enterprise that both create value for their shareholders, but anticipate different growth rates. Fruhan (1979) found that the market value of equity to the book value of equity ratio that is used in the second example corroborates well with the economic to book value of equity ratio for enterprises with similar historical investment opportunities as reflected in the ROE and equity growth rates.

Table 4.4 (a): A hypothetical analysis of the effects of the same growth rate on value created and destroyed by three enterprises

	Book value of equity (Rm)	Return on equity (ROE) (%)	Cost of equity (K_e) (%)	Free cash flow (FCF) (Rm)	Expected growth in net worth (%)[b]	Economic to book value of equity ratio (Rm)	Value created or destroyed	
							(Rm)	Per share (c)[d]
1	5,0	26 (15)[a]	19	6,3	10	1,50 (7,5)[c]	2,5	250
2	4,0	21 (2)	21	3,3	10	1,00 (4,0)	0,0	000
3	4,5	11 (4)	16	3,1	10	0,80 (3,6)	–3,1	–310

Notes:
a Expected number of years for which above-average returns could be achieved
b Growth in this context refers to the percentage growth in net worth contributed by retained earnings
c Figures in parenthesis indicate the R-value of the economic value created
d The number of issued ordinary shares for each enterprise is 1,0 million

Table 4.4 (b): A hypothetical analysis of the effect of different anticipated growth rates on value creation and destruction by two enterprises

	Book value of equity (Rm)	Market value of equity (Rm)[a]	Return on equity (%)[b]	Cost of equity (%)	Expected growth (%)	Market to book value of equity ratio	Value created or destroyed	
							(Rm)	Per share (c)[c]
1	5,0	11,5	35	29	25	2,3	6,5m	216
2	5,0	7,5	25	18	5	1,5	2,5m	83

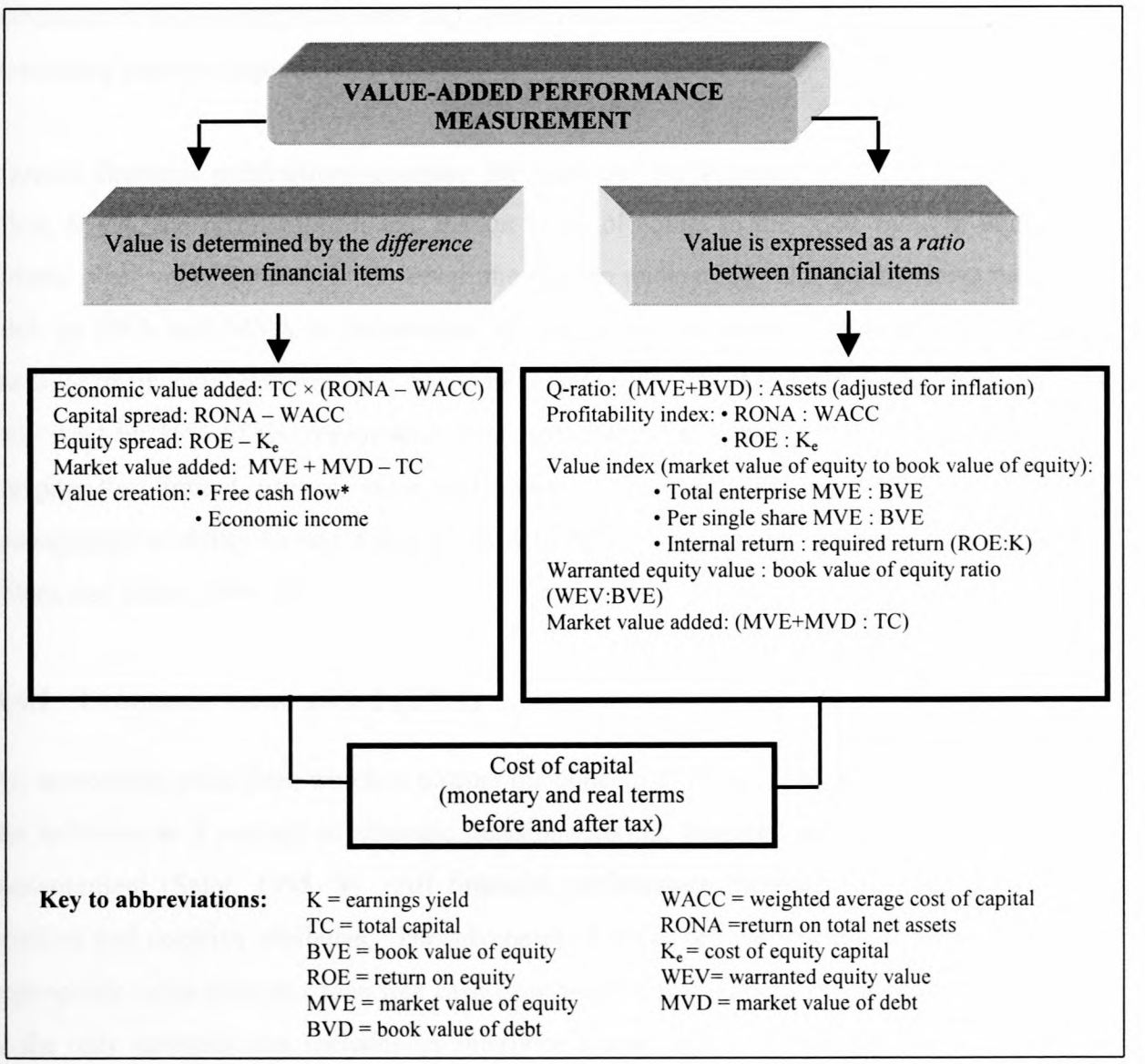
Notes:
a The market value of equity is calculated as income accruing to shareholders divided by the cost of equity
b Based on a five-year forecast for ROE
c Assume that each enterprise issued 3,0 million ordinary shares

The information in Table 4.4 (a) indicates that all three hypothetical enterprises expect a 10% growth in equity over the indicated period. It is clear that the economic to book value of equity ratio which is used to gauge value creation illustrates that in the case of enterprise one the spread (ROE–K_e) is 7%, enterprise two is zero per cent, and enterprise three is negative 5%. Enterprise one, which has a positive spread, creates economic value of R2,5 million that translates to a value of 250c per share. Enterprise two creates no value due to a zero spread, while enterprise three destroys economic value of R3,1 million, which implies 310 cents per share. It is possible to conclude that due to ROE > K_e in the case of enterprise one and ROE < K_e in the case of enterprise three a differential in value created of 224% exists for the same rate of growth.

The main characteristics of the second example (Table 4.4.(b)) indicate the same book value of equity and a positive equity spread (ROE > K_e) for both enterprises. The main difference is the anticipated growth rate in net worth over the following five years. Both the CI and LI enterprises create value for their shareholders; however, enterprise one expects net worth to grow by 25% over the following five years, while enterprise two anticipates a 5% growth rate. The market (price per share) to book (value per share) ratio indicates more value is created by enterprise one, hence a ratio of 2,3 as opposed to enterprise two, which has a 1,5 market to book ratio. Despite the fact that both CI and LI enterprises are economically profitable, enterprise one creates 160% more value per Rand of equity invested than enterprise two.

4.4 Analysis of value-added performance indicators

A variety of value performance indicators could be considered to analyse management's ability to create or destroy value for the enterprise's shareholders. Figure 4.2 is a representation of value-creation indicators that are used to analyse an enterprise's financial performance. The value indicators are classified on the basis of an absolute measure of value creation (expressed by the *difference* between two financial items) and those that are expressed as a *ratio*. The former indicates the actual amount of value added or destroyed, while the latter expresses the value in the form of a ratio which is assessed on the basis of larger or smaller than one. However, it is possible that an absolute value figure could also be expressed as a ratio of its book value figure.



* Discussed in section 4.3.1 as part of the Shareholder Value Approach

Figure 4.2: A representation of indicators used for value added performance measurement (**Sources**: Walsh, 1993; Chadwick, 1994; McTaggart *et al.*, 1994; Stern and Hahn, 1995 and Stern, 1997)

In several cases a need exists to express the financial magnitudes as a ratio, which would enable relevant comparisons between value created by various enterprises. However, in order to analyse value performance indicators across a sample of enterprises, it becomes essential to standardise the value indicators. For instance, EVA or MVA can be effectively standardised by expressing these figures for a given year as a ratio to capital for a base year, which is multiplied by 100. Effectively, all the enterprises have the same size (capital of R100) for a historically specified base year. Furthermore, this standardisation procedure provides an

indication of those enterprises with high growth rates of capital and also those that add value to existing and new capital.

Various financial publications compare the financial performance of enterprises based on EVA, MVA, the profitability index, market value of equity to the book value of equity and several other value indicators. However, the need to understand value performance indicators such as EVA and MVA is necessitated by the limited knowledge and use of value as a measure of financial performance. Fasol and Firer (1995: 75) found that EVA, for instance, is only used by 15% of the respondents who participated in a study of JSE listed enterprises. Despite the limited use of value indicators of financial performance, an analysis of management's ability to add value to its activities has gained prominence in recent years (Stern and Hahn, 1995: 30).

4.4.1 Economic value added (EVA)

An appropriate basis from which to discuss the concept of EVA is the significance attached to the indicator as a concept of strategic decision-making, financial analysis and performance measurement (Saint, 1995: 9). All financial performance measures including EVA have positive and negative attributes. The advocates of EVA believe that this measure is a more appropriate value indicator than free cash flow when financial performance is determined. It is the only yardstick that includes an enterprise's total cost of capital, while other financial evaluation measures do not explicitly consider the total cost of capital (Saint, 1995: 10). The concept of EVA, which is already adopted as a financial performance indicator by major United States corporations such as Coca-Cola, Quaker Oats, and Briggs and Stratton, enabled them to gain a competitive advantage and show substantial increases in market value since the adoption of EVA (The real key to creating wealth, 1993: 24-32). In addition, EVA is regarded as superior to accounting profits because the concept recognise the cost of capital and hence, the riskiness of an enterprise's operations (Lehn and Makhija, 1996: 34). The arguments against the use of this performance indicator stem from the limitation that the measurement neglects future expectations by focusing exclusively on previous financial results.

EVA is regarded as an internal measure of value added designed to emphasise the aspects of the enterprise's operating performance most closely under the control of management (Stern

and Hahn, 1995: 30). In financial terms EVA is expressed as the total capital (TC) multiplied by the difference between the actual rate of return on capital (r) and a prescribed minimum threshold cut-off (c) which is equal to the require rate of return (WACC) and is dependent on perceived investor risk (Stern and Hahn, 1995: 32). The components of EVA are expressed in equation (6):

$$EVA = TC \times (r - c) \quad \text{.....(6)}$$

Alternatively, EVA can be expressed in terms of its main elements; i.e. the previous years' total capital (TC_{t-1}) and the net operating profit after tax (NOPAT). Equation 6 can be rewritten in the form of equation (7) (Stewart, 1991: 137):

$$EVA = TC_t \times \left(\frac{NOPAT}{TC_{t-1}} - WACC_t \right) \quad \text{.....(7)}$$

$$\text{or } EVA = NOPAT - c^* \times \text{totalcapital,}$$

where c* is the cost of capital

All the components of EVA as expressed in equations 6 and 7 are under the control of management, which makes it an ideal measure to use when evaluating historical performance, conducting strategy planning and compiling management incentive compensation plans (Stern and Hahn, 1995: 30). Saint (1995: 10) indicates that managers should be careful not to run the risk of EVA becoming the bottom-line measurement of a person's worth to the enterprise, but stresses the management by results orientation, which implies that workers are extrinsically motivated by EVA. If this is consistent with management's philosophy of controlling the work force from the top down, EVA is an appropriate measure of performance. The following hypothetical information in Table 4.5 is used to illustrate the effects of value performance if EVA is used as a measure of value.

It is possible to calculate EVA by using equation 7 for both a profitable enterprise and the non-profitable enterprise. A non-profitable enterprise is used as a referral to a destruction of value. The profitable enterprise succeeds in adding R48 million of economic value, while the non-profitable enterprise destroys economic value of R60 million. The profitable enterprise

by virtue of its positive capital spread creates a differential of 225% between it and the non-profitable enterprise. Positive EVA enterprises have a RONA that exceeds the cost of total capital (WACC). Conversely, if the cost of capital exceeds the expected return on total capital the enterprise destroys value as indicated in the case of the non-profitable enterprise.

Table 4.5: A comparison of economic value added (EVA) for a profitable and a non-profitable enterprise

	Enterprise A (profitable)	**Enterprise B (non-profitable)**
Book value of total capital (Tc_t) (Rm)	600	600
Return on total net assets (RONA) (%)	30	15
Weighted average cost of capital (WACC) (%)	22	25
Spread (RONA–WACC) (%)	8	–10
NOPAT (Rm)	135	196
Capital growth over time (difference between $TC_t - TC_{t-1}$) (Rm)	150	40

Inflation also affects the use and interpretation of EVA as a value performance indicator. De Villiers (1997) believes EVA in its current form as expressed in equation 7 should be adjusted for the distortions caused by inflation. An adjusted economic value added (AEVA) is proposed by De Villiers (1997: 299) and is expressed in the form of equation (8):

$$AEVA = NOPAT - a^* \times (current\ value\ of\ capital) \quad \text{.....(8)}$$

where: a* refers to the required accounting return of an enterprise

The AEVA is calculated as NOPAT on the current value of capital employed by the enterprise (De Villiers, 1997: 297). The current value of capital employed refers to the present value of remaining cash flows of projects which indicate a marginal return (De Villiers, 1997: 296). This AEVA calculation provides an alternative to inflation accounting and could therefore be used under inflationary conditions to estimate actual profitability from conventional accounting information and procedures. The primary differences between the standard EVA and the AEVA are the use of an adjusted required return (cost of capital) and the current value of capital. The need to express the cost of capital in real terms was highlighted in section 4.2.1.1. Furthermore, the need to adjust capital for a revaluation is also emphasised in order to reflect the current value of capital.

4.4.2 Market value added (MVA)

The premise for operating and managing an enterprise's business activities relates to the ability of management to create shareholder wealth. MVA is a value performance indicator that is forward-looking and incorporates and discounts the market's view of the future and the current performance of an enterprise as expressed by the trading of its shares. Moreover, MVA is the criterion used to gauge the overall success or failure of the enterprise's ability to generate value (Stern and Hahn, 1995: 30).

Market value added is a measure closely related to EVA both theoretically and empirically. It indicates the difference between the market value of an enterprise and economic book value of the capital it employs (Lehn and Makhija, 1996: 35). It is important to note that total capital is an enterprise's economic book value and not its accounting book value. Stern and Hahn (1995: 30) believe that economic book value adjusts accounting book value for as many as 122 anomalies that renders the accounting model a poor approximation for economic book value. These anomalies include deducting capital expenditures such as research and development costs as an expense and focusing on the tax provisions instead of on tax paid. Consequently, managers who improve EVA will be rewarded with a higher MVA. Lehn and Makhija (1996: 38) further highlight the correlation between EVA and MVA and stock price performance, affirming their effectiveness as value performance measures. Research conducted by Stewart (1992: 23) indicates that MVA (over and above the original capital) correlates best with EVA. Enterprises in the United States which add the most market value highlight the deficiencies of other traditional performance measures such as turnover, profits, ROE and market capitalisation discussed in Chapter 2 (America's best wealth creators, 1993: 52-53).

The calculation of MVA is based on the difference between the total market value of debt and equity (MVE) and total capital (TC) provided by lenders and shareholders for management stewardship (Stern and Hahn, 1995: 30). The MVA indicator is expressed in equation (9):

$$MVA = MVE - TC \quad \text{.....(9)}$$

Market value represents the market value of equity on a specific date, generally known as market capitalisation (market price multiplied by the number of issued ordinary shares) and the book value of all the other components of total capital. The value of total capital will depend on the manner in which it is defined. A comparison of MVA and EVA shows contrasts between the stock markets expectation of performance as measured by the MVA and the current performance of the enterprise as measured by EVA. Theoretically, an enterprise's MVA at a given point in time is equal to the discounted present value of the yearly EVA it is expected to generate (Lehn and Makhija, 1996: 35). Table 4.6 provides hypothetical information that is required to illustrate the effect of MVA for two enterprises which have different market values.

The calculations indicate that enterprise A manages to create additional value of R100 million, while enterprise B only succeeds in creating R50 million of value. This is primarily due to the perceptions of shareholders regarding the potential of the enterprise to create wealth. If size is an important criterion for value creation, it is difficult to compare large and small capitalised enterprises. It therefore becomes essential to analyse MVA by placing all enterprises on a uniform basis. One approach is to express the MVA performance indicator as a ratio (MVE/TC) as opposed to the difference between MVE and TC. This approach effectively standardises all the enterprises to the same size and further facilitates comparisons between large and small enterprises. However, the use of a ratio eliminates the contribution of size to value creation.

Table 4.6: A comparison of MVA of two enterprises that create value for shareholders

	Enterprise A	**Enterprise B**
Book value of total capital (Rm)	130	130
Market capitalisation (number of issued shares × market price) (Rm)	230	180
Book value of debt (Rm)	80	90
Adjusted book value of fixed assets (Rm)*	130	130
Inflation rate (%)	10	10
MVA (Rm)	100	50

* The method used to revalue fixed assets will impact on the adjusted value of the assets

4.4.3 Tobin's Q-ratio

Tobin's Q-ratio, which is an overall wealth-creation indicator, is similar to MVA because it represents a market to book value of equity multiple, i.e. the market value of equity to the value of the enterprise's assets, adjusted for inflation (Chadwick, 1994: 144). In algebraic form the Q-ratio is expressed in equation 10:

$$\text{Q-ratio} = \frac{\text{Market value of equity + book value of debt}}{\text{Inflation-adjusted fixed assets}} \quad \ldots\ldots\ldots\

inflation. Conversely, instances where the market to book ratio is higher than the Q-ratio, it is possible that debt decreased and assets are revalued.

Table 4.7: A comparison of the top six ranked enterprises in South Africa according to their Q-ratio performance for 1992 to 1995

Enterprise	1995	1994	1993	1992
Spur Holdings	13,15 (9,51)*	10,80 (12,80)	9,12 (15,57)	3,81 (6,19)
Q-data	5,80 (4,87)	5,62 (12,83)	4,59 (5,18)	2,69 (2,09)
M-Net	5,47 (11,61)	4,24 (26,59)	2,51 (3,83)	2,79 (4,32)
Foschini	4,60 (5,88)	3,38 (7,06)	2,95 (5,46)	2,88 (4,70)
Edgars	4,47 (5,79)	3,59 (7,00)	3,06 (4,98)	3,05 (4,47)
Specialty Stores	4,22 (3,46)	1,77 (3,09)	1,05 (1,49)	1,12 (1,26)

* The figures in parenthesis indicate the market value of equity to book value of equity per share

Sources: Bruce, 1996: 126 and Bureau for Financial Analysis, 1997

This method of analysis also highlights the importance of inflation by valuing the assets at replacement rather than historic cost. Therefore, an evaluation based on the Q-ratio provides a more realistic perspective on value created by an enterprise. The importance of analysing financial performance over time is emphasised by the fluctuations that occur in the Q-ratio of Spur Holdings over the period 1992 to 1995. It would be more realistic to analyse financial performance by using a Q-ratio average (9,30) for Spur Holdings over the financial period.

4.4.4 Profitability index

The profitability index is a financial performance indicator that highlights management's ability to achieve returns on capital which exceed the cost associated with that capital. The same premise applies to ROE and K_e. The index is calculated as the RONA divided by WACC, which represents the cost of capital. The need to analyse financial performance over an extended period of time makes it essential to calculate the index on an average basis of, say, five years. If the average index is larger than one, the enterprise's return on capital exceeds its cost of capital. However, if the index is one, the enterprise is just covering its cost of capital, while if the index is less than one, an enterprise is not achieving its required rate of return (Stern and Hahn, 1995: 36).

4.4.5 Value index: Market value of equity to book value of equity

The market value of equity to book value of equity (MVE:BVE) ratio is often used to analyse whether or not value is created or destroyed by the enterprise. As indicated in Figure 4.2, it is possible to identify three variations of the (MVE:BVE) ratio, i.e. for the total enterprise, per share and an internal return measure which is expressed as a percentage of the required return expected from investors. Several authors have considered the use of MVE:BVE to determine an enterprise's financial performance. These include Ernst and Ross (1993); Mahajan *et al.* (1992); Walsh (1993); McCrory and Gerstberger (1992) and Fruhan (1979)]. Each of the three MVE:BVE ratios is subsequently discussed.

4.4.5.1 MVE:BVE for the total enterprise

This MVE:BVE ratio is generally regarded as the standard market to book ratio calculation. It indicates the relationship between the market capitalisation and the book value of the shareholders' interest in the books of the enterprise (Walsh, 1993: 158**).** An alternative for calculating the market value could also be to divide the income attributable to ordinary shareholders by K_e (Fruhan, 1991). This ratio is therefore an equity-based indicator of value creation. A value of less than one indicates that management is destroying value, while a figure of larger than one indicates that shareholders believe management are using capital in a manner which instils confidence in the share price of the enterprise.

The ROE in relation to the K_e impacts significantly on the market to book value ratio of a share. Fruhan (1979) indicates that a figure of one is obtained when ROE and K_e are equal. It is further necessary to analyse the market (replacement) value of the fixed assets and stock as opposed to their book value and determine the impact on the market to book value per share. Fruhan (1991: 32) further suggests that the highest market to book value ratio is obtained when ROE is maximised and the distribution rate (growth in retained earnings) is reduced. This implies an increase in reinvestment. Conversely, a low ROE and a 100% retention rate provide the lowest market to book value ratio. Therefore, growth has a positive effect on value only if profitability (measured by ROE) is maximised.

The necessity to use replacement cost accounting principles as opposed to historical cost is essential for the calculation of the market to book value ratio (Fruhan, 1979). This is

particularly significant when the replacement cost of stock and fixed assets is considered. A detailed analysis of the enterprise's accounting policy is necessary in order to determine the current valuation procedure of fixed assets and stock. The book value of equity would be adjusted by the revaluation of fixed assets.

4.4.5.2 MVE:BVE for a single share

The market to book ratio can also apply to a single share (Walsh, 1993: 158). Market value is also generally referred to as the price at which the share is currently trading. The book value per share of an enterprise's equity is determined by dividing the total ordinary shareholders' interest by the number of shares outstanding (Kolb, 1983: 74). The enterprise that has intangible assets such as goodwill, patents and licences would exclude these items in the overall calculation of the book value of equity (Du Plessis and Mostert, 1997: 143). Both the general MVE:BVE indicator (see section 4.4.5.1) and the MVE:BVE per share provide the same result.

4.4.5.3 Internal return versus required return

As a market to book multiple, this ratio relates the return on total shareholders' interest (ROE) of the enterprise to the earnings yield (K). It is a relationship that has important consequences for management (Walsh, 1993: 158). The market-driven nature of this ratio highlights the sentiment of investors towards the enterprise's shares. If the share price increases, the yield (EPS divided by market price per share) decreases, while if the share price decreases K increases. If an enterprise has high-yielding shares, this implies that shareholders do not favour investment in the enterprise.

However, to obtain a more adequate reflection of investor return, growth in earnings per share should be considered. Growth in earnings per share and ROE are highlighted as part of a selected number of traditional performance indicators in Chapter 2. Under normal conditions ROE would not fall below K. The result is interpreted in the same manner as the previous market to book indicators. Walsh (1993: 160) believes that from any K position, return on total shareholders' interest drives both the enterprise and shareholder value.

The three market to book value ratios appear to be sound criteria to measure the financial performance of an enterprise. Aspects that relate to the enterprise's profitability and investment policy are analysed by these value performance indicators. These indicators could be regarded as a relevant and appropriate benchmark to use when determining whether or not management creates shareholder value. In addition, the results of these ratios could be used as a preliminary indication of value creation and should be regarded together with other indicators of value to obtain an overview of financial performance.

4.4.6 Warranted equity value (WEV) to book value of equity

The warranted equity value (WEV) of an enterprise is an internal indicator of financial performance. It is possible to highlight two approaches used by McTaggart *et al* (1994) to determine the WEV, i.e. the Equity Approach and the Total Capital Approach. McTaggart *et al* (1994: 301) believe that both these approaches will produce the same WEV if applied correctly. The Total Capital Approach uses the warranted capital value (WCV), which represents the projected after-tax operating cash flow the enterprise will generate over time, discounted by the WACC, less the market value of debt (MVD) to determine the WEV. The formula for the WEV is expressed algebraically in the form of equation 11:

$$WEV = WCV - MVD \quad \text{.....(11)}$$

McTaggart *et al* (1994) reaffirm the need to apply flow through accounting principles in order to calculate the WCV as highlighted above. However, in many instances it is not possible to accurately determine the market value of debt. Capenski (1996: 56) suggests that the book value of interest-bearing debt is an adequate proxy for the market value of interest-bearing debt in instances when market values are unavailable.

The Equity Approach to determine the WEV is based on the enterprise's future equity cash flow it will generate over time, discounted by the K_e (McTaggart *et al.*, 1994: 345). McTaggart *et al* (1994: 341) define equity cash flow as the portion of earnings paid out to ordinary shareholders. However, from the definition of WEV as defined by the Equity Approach it is possible to deduce a formula for WEV which is expressed in terms of ROE, K_e

and the future growth rate of total shareholders' interest (see MaTaggart *et al.*, 1994: 313-314). The equation is expressed as follows:

$$WEV = \frac{BVE \times (ROE - g)}{(K_e - g)} \quad \text{.....(12)}$$

McTaggart *et al* (1994) warn that the WEV as determined by using the Equity Approach should not be used as an absolute estimate of the value of an enterprise's equity. They recommend using the WEV in relation to book value of equity as a value indicator of financial performance. If the WEV is expressed in terms of the book value of equity, equation 12 is simplified by multiplying the WEV by $\frac{1}{BVE}$. The result is indicated as follows in the form of equation 13:

$$\text{Warranted equity value (WEV) : book value of equity} = \frac{(ROE - g)}{(K_e - g)} \quad \text{.....(13)}$$

If the warranted equity value to book value of equity ratio is larger than one, value is created. Conversely, growth could also decrease the warranted value to book ratio and therefore destroy value if the equity spread is negative. The WEV:BVE ratio expressed in equation 13 is included in the study as part of the value group of financial performance indicators.

The following example illustrates the calculation of WEV by using equation (11) and (12). Assume that an enterprise has book value of equity (BVE) to the value of R84 million, a ROE of 15%, a K_e of 13%, WACC of 9% and (g) of 5%. In addition, NOPAT is R150 million and the change in total capital is R14 million (Tc_t = R124 million and TC_{t-1} = R110 million). This change includes the growth in equity of 5% and an increase in debt of R10 million over the previous year. The market value of debt is R20 million. By substituting the information in equation (11) an amount of R105 million is obtained for the WEV [(R150 million – R14 million)/(1+0,09) – R20 million]. If the book value of equity is subtracted from this figure, R21 million of value is created or a ratio of 1,25 is obtained, which per definition implies value creation. An application of equation 12 provides a WEV of R105 million [(R84 million × (15% – 5%)/(13% – 5%)]. The result and interpretation are the same as for equation 11.

4.4.7 Value creation by discounting economic income

Economic income (EI) is a term used by McTaggart *et al.* (1994: 317) to represent the amount an enterprise earns over and above all costs, which include capital costs incurred during the operation of the business. The capital cost is determined by the total shareholders' interest in the previous financial year multiplied by the cost of equity (K_e). The following example illustrates the calculation of economic income for a single period: Assume that an enterprise has a total shareholders' interest (BVE) of R100 000 at the beginning of the financial year, a K_e of 10% and income attributable to shareholders is R150 000. By using the information above the EI is calculated as follows: R150 000 – [R100 000 × (10%)]. The result indicates that economic income of R140 000 is generated. It is possible to introduce ROE into the equation which would result in a calculation based on the equity spread (ROE–K_e). Assume that ROE is 15%, the EI then becomes R150 000 – [R100 000 × (15% – 10%)] which provides a figure of R145 000, which is the result of a positive equity spread.

It may be possible to indirectly relate the economic income as a value determinant to the undistributed income (attributable income less dividends declared) of the traditional approach addressed in Chapter 2 and the net cash generated from all activities (cash flow available for distribution less the cash dividends) from the cash flow approach discussed in Chapter 3. The linkages between the three financial items depend on the premise that dividends in the income statement are related to the actual dividend cash flow. This is expressed as the opening balance of dividends payable in the balance sheet plus the dividends declared in the income statement less dividends payable in the balance sheet at year end and the equity spread, which has a direct link to value creation. The retention rate refers to the rate of undistributed income to total income available for distribution, which affects the growth in equity and therefore ROE.

Value is determined by discounting the economic income by the cost of equity over several years. The value creation equation is expressed algebraically in the following form:

$$\text{Value creation} = \sum_{t=1}^{\infty} \frac{BVE_{t-1} \times (ROE - K_e)}{(1 + K_e)} \qquad \ldots\ldots(14)$$

The present value of the economic income stream as indicated in equation 14 is equal to the WEV less book value of equity discussed in the previous section (McTaggart *et al.*, 1994: 322).

4.5 Value-added (VA) statement and operational value-added performance

The VA statement is not a recent addition to current financial statements published by enterprises, but stems from a decision in 1975 by the Accounting Standards Steering Committee in Britain, which proposed the inclusion of VA statements as part of financial reporting by enterprises (Owen, 1994). South African enterprises are not compelled to include VA statements as part of their financial reporting, but an increasing number of enterprises publish VA statements.

No accounting guideline is available which would enable the publication of standardised VA statements. Standardisation is complicated by the differences that exist among the VA statements published by enterprises. Consequently, it is often not possible to compare the VA statements of two or more enterprises (Janse van Rensburg, 1990: 1). However, several differences exist between published VA statements and attempts to standardise VA statements. Van Graan (1991: 8) highlights several practices applied by enterprises, which makes comparisons of value-added performance a complex task:

- Value-added tax is included by certain enterprises when compiling VA statements;
- Net interest is used in place of gross interest (interest received should be indicated separately from interest paid);
- Income retained by the enterprise is transferred to reserves;
- Various methods are used to indicate the effect of minority shareholders' interest on the income of the enterprise;
- In certain cases enterprises capitalise interest and do not indicate it as an expense.

The VA statement is an operational analysis of the enterprise's activities. It primarily offers an indication of the percentage of the contribution (turnover minus cost of sales) which is absorbed by various operational figures of importance to the enterprise. Management are particularly interested in relating financial figures such as wages and salaries, interest,

dividends, taxation, operating income, capital employed and sales to value added. This section is included in order to enhance management's operational decision-making and provides only a basic guideline for operational value performance. It therefore complements value creation, but does not offer an indication of the actual market value created by the enterprise. In this context operational value added is not considered as the primary basis for value creation in the enterprise and is not elaborated upon in the text.

4.6 A critical evaluation of value performance measurement

The importance of value creation is emphasised as a measure of management's ability to maximise opportunities for the enterprise and its shareholders, while minimising the costs associated with the capital at its disposable. Value analysis forms the basis for a critical evaluation of its significance for financial performance measurement. The relative importance of value creation indicators as measures of financial performance is discussed in the first part of this section. Furthermore, the information content of value creation indicators is analysed by highlighting the financial position of two enterprises. The results provide a conceptual decision-making base regarding which indicators are the most appropriate. In addition, several evaluation criteria are analysed and their relevance and applicability for use in value assessments are determined for several value indicators. These criteria differ from those in Chapters 2 and 3, which were used to evaluate the traditional and cash flow performance indicators. In the final instance, several key pointers are provided which are related to value analysis and the linkages between the traditional, cash flow and value added approaches to financial performance measurement are also discussed.

4.6.1 The relative importance of value analysis indicators

The importance of shareholder value as a strategy to enhance performance analysis should be addressed in the context of the degree of capital or labour intensity of an enterprise. However, the emphasis placed on the use of shareholder value measurement in the literature emphasises the need for management to maximise the value created by the use of equity provided by shareholders and analyse the consequential effect on the enterprise's share price. The relative importance of value indicators is considered under three headings, namely:

- Conceptual analysis of value indicators

- Practical applicability of value indicators as a measurement tool
- Multi-purpose nature of value assessments and the use of value indicators.

4.6.1.1 Conceptual analysis of value indicators

The need to ascertain whether or not value indicators are a relevant and new addition to financial performance measurement has resulted in significant debate in the literature. However, the contemporary nature of value creation and the indicators which are used to assess value performance has caused a shift in emphasis from traditional and cash flow analysis to value assessments. The current focus in the financial management literature highlights the use of the EVA and MVA as key financial performance indicators (Stern, 1997; Lehn and Makhija, 1996; Capenski, 1996; Groth, Byers and Bogert, 1996 and McConville, 1994). These references primarily focus on maximising the use of value as indicator of performance, while highlighting the relevance and importance of value as an indicator of strategic change and the enhancement of management systems.

4.6.1.2 Practical applicability of value indicators as a measurement tool

The nature of value-added performance measurement poses the question of whether or not indicators such as EVA and MVA are uniformly applicable across the business spectrum. In other words, a need exists to determine whether or not the indicators are applicable to manufacturing enterprises and cyclical (seasonal) enterprises as well as financial institutions and non-profit organisations. Capenski (1996: 56) highlights the use of MVA and EVA in both investor-owned public companies and non-profit organisations such as health-care organisations. In this study, EVA and MVA are analysed in the context of the CI and LI nature of an enterprise over upswing and decline phases of the economic cycle.

Stern (1997: 27) indicates that over 300 enterprises in the United States, United Kingdom and Western Europe, the Asian Pacific and South Africa have successfully implemented the EVA concept as a measure of value creation. The practical relevance of the value added concept is emphasised by two examples of corporate leaders of Berkshire Hathaway and The Coca Cola Company who have endorsed this approach. In an annual report to shareholders in 1993, Warren Buffet reports the following key achievement factor for the enterprise (Buffet, 1993: 2-3):

> Our long-term economic goal is to maximise the average annual rate of gain in intrinsic business value on a per share basis. We do not measure the economic significance or performance of Berkshire by its size, we measure by share progress.

This objective refers to the shareholder value approach discussed in a previous section. In addition, a report in the popular literature notes that "the most noteworthy change at Coca Cola under the chairmanship of Roberto C. Goizueta is the shift in focus from boosting sales to maximising shareholder returns" (Leaders of the most admired, 1990: 24).

The practical application of value indicators is further enhanced by the plethora of articles appearing in the business and financial press, which emphasise the importance of shareholder returns along with other indicators of financial performance. The following examples illustrate the use of value indicators for comparing financial performance between enterprises. Table 4.8 highlights several United States enterprises that created and destroyed the most value for their shareholders in 1995.

Table 4.8: A comparison of MVA and EVA for several United States listed enterprises in 1995

Enterprise	MVA ($m)	EVA ($m)	Total Capital ($m)	RNOA (%)	Cost of Capital (%)
Wal-Mart Stores	35 974	265	30 668	12,8	11,8
Coca Cola	87 820	2 140	9 276	37,2	12,0
Philip Morris	51 628	1 165	40 911	17,3	14,4
General Electric	80 792	1 852	51 017	17,5	13,5
Merck	63 440	1 115	19 792	19,6	13,5
Microsoft	44 850	1 345	4 889	50,0	13,1
Black and Decker	545	(194)	5 411	6,3	10,1
McDonnel Douglas	4 005	(729)	6 710	0,8	11,0
Ford Motor	(12 965)	1 591	33 942	12,8	9,8
Occidental Petroleum	(1 948)	(549)	18 022	5,6	8,1

* The figures in parenthesis indicate a destruction of value

** No particular order is assigned to the enterprises listed in the table. It represents a random selection of enterprises in order to indicate various aspects related to value performance measurement.

Source: Lieber, 1996: 61-66

The principles of value creation are clearly evident in Table 4.8. Those enterprises which manage to achieve a higher return on capital than the associated cost create internal value for their shareholders. It is further evident that the perception of shareholders is an important aspect related to the ability of the management to add market value, while the EVA indicator is based on the return and cost of total capital. For instance, Black and Decker achieved a negative EVA, but managed to add market value. In contrast, The Ford Motor Company managed to create internal value due to a positive EVA, but destroyed market value. However, Occidental Petroleum destroyed both internal value and market value as indicated by the negative EVA and MVA figures. This enterprise needs not only to utilise capital resources more efficiently, but enhance positive shareholder sentiment by changes brought about by management in the enterprise. Table 4.9 highlights several value performance indicators applicable to a selection of South African JSE listed enterprises over a five-year period from 1992 to 1996.

Table 4.9: A comparison of value performance indicators for several South African enterprises over a five-year period from 1992 to 1996

Enterprise	Five-year change in MVA (Rm)	Five-year change in EVA (Rm)	Five-year average total capital growth (%)	Five-year average return on total capital (%)	Five-year profitability index (RONA/WACC) (%)
Wooltru	3 604	40	14,3	23,8	1,3
Edgars	1 704	21	18,4	24,4	1,5
Tiger Oats	2 505	12	15,1	18,2	1,0
Q-Data	2 473	19	45,2	44,9	2,5
SFW	986	(5)	6,8	12,1	0,6
Amrel	(26)	(49)	17,6	6,5	0,4
Romatex	82	(49)	(8,4)	7,4	0,4
Toyota (SA)	(626)	(116)	15,0	12,3	0,7

Note:

* The figures in parenthesis indicate a destruction of value

** No particular order is assigned to the enterprises listed in the table. It represents a random selection of enterprises in order to indicate various aspects related to value creation and destruction.

Source: Stern, 1997: 30, 32, 34, 36

A performance analysis of the enterprises listed in Table 4.9 would commence by analysing the EVA and MVA indicators. It is clear that over the five-year period the majority of the enterprises manage to add market value. Only Toyota (SA) and Amrel destroyed value as measured by the MVA indicator. If MVA is related to the EVA figures of the enterprises, it appears that investors in SFW and Romatex are more positive about the enterprise, if compared to the operating performance as measured by EVA. This situation is highlighted by a profitability index of smaller than one, which indicates value destruction. It is clear that SFW, Amrel, Romatex and Toyota (SA) are enterprises with low average returns on capital and are not able to meet investors' requirements.

4.6.1.3 Multi-purpose applications of value assessment indicators

The use of value indicators is not limited to the measurement of financial performance. The EVA indicator in particular, as well as the MVA concept has wider application potential and is used in a variety of ways to inform management regarding particular decisions. EVA and MVA are used, among other things, to evaluate projects, which may involve strategic acquisitions, to enhance corporate governance, which includes creating employee

compensation schemes and inform investment analysts when to buy and sell shares for client portfolios.

General capital budgeting rules dictate that a project is acceptable if it has a net present value of more than zero. Net present value is linked to MVA in the context of what the project is expected to add (or subtract) from MVA. Capenski (1996: 58) indicates that the NPV rule assists management to avoid investing in projects that are forecast to have negative MVAs. The ideal situation results when projects with high NPV are responsible in part for producing high MVAs. Alternatively, projects which generate higher returns in excess of the required returns also add value (Groth *et al.*, 1996: 28). It is possible to analyse potential acquisitions in the same manner by using EVA to establish what is termed an expenditure prioritisation system (Stern, 1997: 27).

The emphasis on EVA as an internal measure of performance often links its usefulness to corporate governance (McConville, 1994: 55). An application of EVA within an enterprise should not only encourage the top management structure to create value, but also other levels of management. The measure should therefore be an incentive for top managers to create value, which becomes the reward for achieving the governing objective of maximising shareholder value (McTaggart *et al.*, 1994: 273). Economic value added is therefore used as an incentive system to provide accountability for sustaining and improving the enterprise's EVA performance. Stern (1997: 27) believes that the use of EVA culminates in the payment of bonuses, which is determined as a percentage of EVA improvement, but with only one-third paid in the year declared. The remainder is held at risk and would be forfeited if EVA improvement is followed by value destruction. The importance accorded the EVA and MVA concept in corporate governance is further highlighted by what Lehn and Makhija (1996: 36) term corporate turnover, which refers to corporate firings of the chief executive officer. They determined that a significant relationship exists between corporate turnover and both MVA and EVA. This revelation results in a necessity by management to rethink operating procedures, reconsider expansion projects and weigh equipment purchases in a different light.

Ultimately, managing the enterprise's operations in a successful manner implies identifying value drivers that focus on the core competencies of the business. This would include analysing the core assets and skills of the enterprise by giving attention to issues such as the

management of knowledge, brand franchises, favourable retail locations, patent product technology and low-cost core operations. The latter refers to a detailed analysis of the internal restructuring of the enterprise, which may be required if the enterprise significantly destroys value over time, both in terms of MVA and EVA.

4.6.2 An evaluation of the information content of value indicators

In order to analyse the information content of value indicators and conceptually identify several indicators which are appropriate measures of value performance, an evaluation of several previously identified indicators is conducted by applying the data obtained from the financial statements of two enterprises (Bureau for Financial Analysis, 1997). Both enterprises form part of two groups of CI and LI enterprises that are used in the study to ascertain the behaviour of financial indicators. Engen forms part of the upper percentile and represents the CI enterprises and Protea Furnishers (Profurn) forms part of the lowest percentile and represents the LI enterprises. The results are presented in Table 4.10 and are based on the 1995 and 1996 financial years. Appendix 4 provides a glossary of key items together with the figure calculated for each magnitude required to determine a value or ratio for the value indicator formulae presented in Table 4.10. The calculations are based on the following premises:

- Where required after-tax figures are used
- Where applicable averages for two years are used for each enterprise.

Table 4.10: *An evaluation of various value indicators applied to a CI and an LI enterprise*

Title	Formula	Performance measurement				Value creation/ destruction measure	
		R-value (R'000) or percentage difference		Ratio			
		Engen	Profurn	Engen	Profurn	Engen	Profurn
Economic value added	TC × (RONA – WACC)	(587 126)	1 084	N/A	N/A	✖	✓
Market value added	MVE – TC or MVE/TC	(66 050)	164 052	0,99	1,64	✖	✓
Q-ratio	MVE + BVD/ inflation-adjusted fixed assets	N/A	N/A	1,05	1,79	✓	✓
Profitability index	RONA – WACC or RONA/WACC	(6,72%)	0,42%	0,57	1,02	✖	✓
Profitability index	ROE – K_e or ROE/K_e	(13,98%)	(2,41%)	0,32	0,89	✖	✖
Value index:	MVE – BVE or MVE/BVE	594 950	103 586	1,15	1,74	✓	✓
Value index:	MVE – BVE per share or MVE/BVE per share	348c	26c	1,15	1,74	✓	✓
Value index:	ROE/Earnings yield (K)	N/A	N/A	0,83	1,77	✖	✓
Warranted equity value (WEV): BVE	$\frac{(ROE - g^{**})}{(K_e - g)}$	N/A	N/A	0,11	0,82	✖	✖

Key to abbreviations:

TC = total capital
BVD = book value of debt
g = growth in net worth
ROE = return on total shareholders' interest
BVE = book value of equity
MVE = market value of equity
K_e = cost of equity capital
RONA = return on total net assets
WACC = weighted average cost of capital

✓ - The value measure indicates value creation
✖ - The value measure indicates value destruction

N/A Implies the indicator is not expressed in absolute terms, but as a ratio or vice versa. The following indicators of value creation are based on a discounted stream of economic profits and cash flow respectively. The formulae are highlighted, but not calculated for the two enterprises:

Economic income stream discounted by K_e: $\sum_{t=1}^{\infty} \frac{BVE_{t-1} \times (ROE - K_e)}{(1 + K_e)}$ Cash flow stream discounted by K_e: $\sum_{t=1}^{\infty} \frac{\text{Free Cash flow}}{(1 + K_e)}$

Notes:

Figures and percentages in parenthesis indicate a negative value or percentage and therefore value destruction

* The total capital in this case includes interest-bearing debt (short and long term), preference shares and ordinary shareholders' interest and is the change from one year to the next.

** The growth rate is a future growth rate and the formula is based on the premise that $g<K_e$. For the calculations above a five-year average future growth rate is assumed to be 5% for Engen and to be 8% for Profurn.

Table 4.10 indicates that many of the indicators could be expressed in both monetary value or as a ratio. The economic income stream and free cash flow stream indicators are based on the future streams of economic income and free cash flow which are discounted at the cost of capital. These measures indicate value as the present value of a future stream of economic income and free cash flow and are mentioned to complement the other indicators of value. If the latter two value indicators are ignored, five of the indicators refer to a market to book multiple, while the EVA indicator is based on operating performance and the WEV/BVE is based on equity growth. In the case of Engen, three of the value indicators illustrate value creation and six indicators value destruction, while for Profurn seven indicators highlight value creation and two value destruction.

More specific deductions related to the value performance indicators emphasise the following points:

- Value indicators such as the profitability index are more "robust" and do not reflect value creation in absolute terms, but serve mainly as an indication of whether or not value is created. In other words, how much value is created cannot be determined. These indicators are preliminary pointers of value creation. The Profurn case illustrates an interesting point in that the equity spread is negative, while the capital spread is slightly positive, which may imply that gearing (debt to equity ratio) in the enterprise is relatively high. Alternatively, the required shareholder returns are not being met, while the overall required return is slightly more than the requirement from both the shareholders and debt capital providers. This possibly suggests that both profitability indices should be used as preliminary indicators of value creation.

- An analysis of the market-related value indicators for Engen illustrates that share price and consequently investor perception is a significant factor when value is analysed. Among the indicators based on market value, three out of the five indicators highlight value creation, although the equity and capital spread are negative. This clearly highlights that value indicators, which are based partly on market-related information, are sensitive to shareholder sentiment.

- An analysis of the three value index figures for Engen indicates that two are positive and the internal return versus required return is negative. It should be noted that none of the value index indicators consider the cost of capital and the basis of value determination is investor sentiment and the manner in which management utilise shareholder capital. The internal versus the required return (K-formula) under normal circumstance should be positive. However, a low return on shareholder capital coupled with a reduction in share price emphasises the sentiment of shareholders towards management's ability to create acceptable returns. The MVE to BVE ratio uses market capitalisation as the main determinant, while the K-formula uses share price in relation to the earnings of the enterprise. The K-formula makes it less possible for management to manipulate the market value by raising and investing as much capital as possible, which increases the size of the enterprise and benefits management. However, this strategy is not in the best interests of the shareholders due to the opportunity cost related to the shareholders' investment.

- The WEV to book value indicator should be considered with caution and appears to be sensitive to the manner in which the enterprise utilises shareholder capital and the anticipated growth in equity. Value creation is significantly affected by the growth in equity, which serves to either enhance value creation or accelerates value destruction in both enterprises due to the ratios being less than one. This indicator would form a key element in a selected number of value indicators.

- Many of the indicators such as return on total shareholders' interest, the cost of equity and the cost of capital are expressed in nominal terms and do not make provision for inflation. However, the Q-ratio indicates the ability of management to maximise the share price and adequately utilise the fixed assets at their disposal. This ratio further enhances value performance measurement by focusing on the utilisation of fixed assets in real terms by making provision for replacement costs.

It is essential to analyse underlying issues related to the value indicators. For instance, the premise of value creation is to achieve higher returns on capital than the related cost. However, a general application of this principle to Engen should conclude that value is destroyed; however, three of the market-related indicators show value creation. Value

creation is possibly achieved by the market value of equity being enhanced by a 16,3% increase in the share price and a 6,3% increase in the shareholders' capital over the two-year period. It is important to identify the underlying relationship between the relevant elements of value creation and the indicator.

A preliminary inference may suggest that EVA, MVA, WEV/BVE and the Q-ratio would serve as mainstream indicators of value performance. Economic value added emphasises the total resources employed, MVA highlights total market value, the WEV/BVE ratio emphasises growth in equity and the Q-ratio the inflation adjustment to fixed assets. The profitability index (RONA/WACC) and the value index figures (MVE/BVE) should be regarded as preliminary indicators of value which offer valuable insight into the possible results that are provided by the mainstream value indicators. The value index indicators do not consider the cost of capital and therefore together with the profitability index figures should be used as first-level indications of value creation.

4.6.3 Evaluation of proposed criteria based on value performance indicators

Several qualitative evaluation criteria are formulated in this section in order to conceptualise the use and relevance of the information provided by value performance indicators. This section expands on the previous section's discussion and provides additional understanding when evaluating appropriate value indicators. These qualitative criteria differ from the criteria formulated in Chapters 2 and 3 primarily due to the nature of value performance measurement, which primarily indicates the result of decisions taken by management. The relevance of the proposed evaluation criteria is determined by the information content of the value indicators and includes the following:

1. The indicator is based on *past performance* and uses the input of traditional indicators to determine whether or not value is created.
2. The indicator reflects *continuity* as a characteristic of a useful measure of financial performance. The value indicator highlights the management's ability to add value to all resources at its disposal during the day-to-day operations of the enterprise.

3. The indicator highlights the *efficiency* (return to cost basis) of the enterprise's operating activities over the short and long term and as a consequence enhance management's ability to grow the enterprise through adequate balance sheet management.
4. The indicator is an *autonomous* value performance measure. In other words, the indicator is not regarded as a means to an end, but as an indication of overall value performance.
5. The indicator emphasises *the effect of market and investor perceptions* on the value created. This implies that the indicator is a forward-looking measure that emphasises investor perception and sentiment.
6. *Growth* in assets, equity (or sales) is considered an important determinant which highlights the sensitivity of value creation or destruction to changes in growth patterns.
7. The indicator is *adjusted for inflation* and thereby creates an indication of the real value created or it is possible to express the elements of the indicator in real terms.

In order to conceptualise the use of the evaluation criteria, an approach is adopted which applies each individual indicator to the proposed evaluation criteria. The relevance of the criteria is analysed on the basis of a dichotomous (yes/no) score obtained after the application of each indicator to the evaluation criterion. Table 4.11 highlights the relevance of a selected number of indicators for measuring financial performance.

Table 4.11: The results from the application of various value performance indicators to the proposed evaluation criteria

Performance indicator	**Criteria**													
	1		**2**		**3**		**4**		**5**		**6**		**7**	
Market value added (MVA)	✖		✓		✖		✓		✓		✓		✓	
Economic value added (EVA)	✓		✓		✓		✓		✖		✓		✓	
Tobin's Q-ratio	✓		✓		✓		✓		✓		✓		✓	
Profitability measure (RONA–WACC)	✓		✖		✓		✖		✖		✖		✓	
Profitability measure ($ROE–K_e$)	✓		✖		✓		✖		✖		✖		✓	
Value index (MVE/BVE)	✖		✖		✖		✖		✓		✓		✓	
Value index (MVE/BVE per share)	✖		✖		✖		✖		✓		✓		✓	
Value index (ROE/earnings yield)	✓		✖		✖		✖		✓		✓		✓	
Warranted equity value: book value of equity (WEV:BVE) (Growth)	✓		✓		✓		✓		✖		✓		✓	
Option (Y = Yes/N = No)	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**
Number	6	3	4	5	5	4	4	5	5	4	7	2	9	0

Note: Each criterion applied to the performance indicator is allotted a [yes/no] option.
✓- the value indicator supports the criterion
✖ - the value indicator does not uphold the criterion

Table 4.11 indicates that a large number of the value indicators generally conform to the specified criteria. Only in terms of the continuity and autonomy criteria are there slightly more ratios that do not conform to the specified criteria. Further results highlight the importance and adaptability of all the mentioned indicators for inflationary purposes. Criterion one indicates that 66,6% of the indicators are based on past performance and in addition rely on traditional performance indicators such as ROE for assessing value. A large number of the market value-added indicators are forward-looking and do not conform to this criterion.

It is possible to conclude from the results that several factors and occurrences affect the applicability of the criterion to highlight the relevance of the indicator. The results indicated by indicators such as EVA and the profitability index are possibly attributable to management's control of the operations of the enterprise. On the other hand, indicators such

as market to book ratios are affected by investor sentiment and are therefore more sensitive to market risk. Management therefore has no general control of market value of the enterprise's shares due to market risk, but may be in a position to manipulate the market value by issuing more shares. However, this would be to the detriment of the shareholders and would be reflected in lower returns.

4.6.4 Key pointers related to value-added performance measurement

It is possible to indicate several specific issues related to the use and application of value performance indicators. These include:

- Linkages with other approaches to financial performance measurement
- Value as a key element of corporate strategy and performance measurement.

4.6.4.1 Linkages with other approaches to financial performance measurement

In order to understand the contribution of value creation indicators to financial performance measurement, it is necessary to analyse the linkages between the traditional, cash flow and value financial performance indicators.

Traditional performance measures are mostly 'static' and analyse financial performance at a point in time. In recent years traditional performance measures such as EPS and RONA appear to have become unreliable predictors of an enterprise's future financial performance (McCrory and Gerstberger, 1992: 33). Shareholder value is traditionally measured by the share price, which could be determined by the enterprise's EPS multiplied by an appropriate price earnings (PE) multiple. The PE ratio adjusts to the variations which occur in an enterprise's earnings, and consequently requires a more reliable measure of value (Stewart, 1991: 22). The failure to understand how share prices are determined makes it difficult for management to reach sensible decisions regarding enterprise strategies, acquisitions, divestitures, financial structure and dividend policy (Stewart, 1991: 21). The objective of corporate planners would be to balance the long-run performance of the enterprise by enhancing the short-term planning horizon.

Cash flow indicators measure performance over a financial period, while certain value-added indicators such as EVA rely on an enterprise's past to evaluate financial performance over a period of a year. Other value indicators such as MVA are forward-looking because they are based on discounted future expectations of an enterprise's performance. EVA uses the traditional performance ratio RONA (after tax) together with WACC to determine whether or not value is created. In addition, the future projected after tax cash flow of an enterprise is also used to analyse and determine value creation by discounting the future free cash flows by the WACC.

It is clear that the value-creation indicators based on past performance rely on traditional indicators such as RONA and ROE and cash flow indicators such as free cash flow to determine the value created by the enterprise for its shareholders. In turn, these figures should also be adjusted for inflation to indicate the real value added by the enterprise to its operational activities.

Many indicators of value are related to, and are affected by, the sentiment or perceptions of the investor market towards the enterprise. The majority of the value indicators highlighted in Table 4.10 consider the movements in share prices as a significant influence on value creation and potential destruction. In contrast to traditional and cash flow performance indicators, value is determined on the basis of the required rate of return from shareholders (cost of capital), which relates to the enterprise's business and gearing risk.

4.6.4.2 Value as a key element of corporate strategy and financial performance measurement

The key objective of financial management is the maximisation of shareholder value over time. In this regard value performance analysis focuses on this key management objective. Value measurement is the result of a process that identifies key relationships on a return to cost basis, and is ultimately based on the forecasted perceptions of the enterprise's operating intentions. In order to analyse the strategic alternatives facing management, a "future-looking" assessment of value would assist managers to plan for future development and furthermore link value creation to the enterprise's competitive and comparative position.

Value analysis enables management to assess the enterprise's business and gearing risk and therefore contributes to addressing the challenges facing management. This often results in a trade-off between maximising customer satisfaction; for instance, and creating value for shareholders through the return to cost premise, which forms the basis for all value measurement assessments. If any strategic decision results in a benefit for shareholders it should be considered. However, if the decision, which may require an extra cost and may not benefit shareholders, would under normal circumstances not be pursued, then the strategy is to the detriment of the enterprise's shareholders.

It is apparent from the critical analysis and illustrations in this section that shareholder value creation is a significant measure for assessing financial performance. Adding value to the resources of the enterprise is the key driver for creating value for shareholders. Maximising returns and minimising costs associated with all the endeavours of the enterprise becomes the core objective for management. The value-added approach suggests significant improvements in financial performance measurement and coupled to both the traditional and cash flow approach provides opportunities to enhance and maintain consistent financial performance measurement over time.

In the context of the value analysis EVA, MVA, WEV/BVE and the Q-ratio should be used as mainstream indicators of value performance. Each individual indicator emphasises a particular aspect of value performance measurement. EVA focuses on total resources employed, the MVA highlights total market value, the WEV/BVE emphasises growth (in equity) and the Q-ratio the effect of inflation on the fixed asset structure of the enterprise. The profitability index (RONA/WACC) and the value index figures should be regarded as preliminary indicators of value, which offer valuable insight into the possible results which emanate from the mainstream value indicators. The value index (e.g. MV:BV) indicators do not consider the cost of capital and therefore together with the profitability index figures should enhance the value measurement process as a first-level assessment of value creation or destruction.

4.7 Summary

The assessment of value in this chapter focuses on the prominence, relevance and usefulness of value-based financial performance analysis. It is possible to remark that value is accorded the new math of financial performance measurement as it has evolved over the past ten years. In order to establish the basis for the discussion of a value-based assessment, the chapter commences with an analysis of the need to understand the concept and relevance of value and its linkages to performance measurement. This introduction to value also includes a discussion of several financial determinants such as RONA, ROE, WACC and K_e, which are used to assess value creation or destruction and determine financial performance.

The following section analyses the shareholder value approach (SVA) to performance measurement by presenting a theoretical discussion and a practical application of the method. The importance of free cash flow (FCF) as a determinant of the SVA approach is highlighted and an indication is provided of how value is determined through the use of incremental investment and cost of capital. Other issues detailed in this section include an analysis of the relationship between sustainable growth and ROE together with other determinants such retention rate, inflation and cost of capital. The effects of growth on the value creation of the enterprise is also analysed by means of two hypothetical illustrations, which indicate that if the economic to book value of equity ratio is larger than one, growth is an enhancing factor. However, if the economic to book value of equity ratio is less than one, the destruction of value is accelerated if growth occurs. The use of growth rates over time as an indicator of financial performance is also emphasised in Chapter 2.

Several value performance indicators are analysed in the following section. The value indicators are categorised as either measuring value in absolute terms, expressed as a ratio or the possibility that an indicator could be expressed as a ratio or the difference between financial items. For instance, MVA could be indicated as market value less total capital or as market value divided by total capital. The indicators are analysed in terms of their information content, the manner in which they are calculated, and in most cases a hypothetical example is provided to emphasise the relevance of the indicator. Linkages between the value indicators are also emphasised in the discussion. A short concise evaluation of the operational

value-added statement is also provided in this section. The difficulties of standardising the value-added statement for purposes of analysis are also emphasised.

The final section of the chapter provides a critical analysis of several aspects related to value performance measurement. The first part of this section emphasises the relative importance of value as a financial assessment tool. In this context, the basis for the discussion is a broad-based conceptual analysis of value performance. A practical assessment of value which highlights endorsements by leading corporations of the concept as a performance measurement tool and the use of value indicators to rank and measure the performance of enterprises against their peers is also provided. Also in this section attention is given to the multi-purpose applications of value for determining, among other things, employee compensation and analysing strategic investment decisions.

Based on the information content of the ratios, several evaluation criteria are developed to assess the relevance of value indicators as a group of financial performance measurement tools. It is possible to conclude that just over half the indicators are forward-looking and are based on shareholder sentiment and perceptions, while the remaining indicators highlight management's ability to enhance capital returns and minimise capital costs. An analysis of two enterprises, one of which is considered as capital intensive and the other labour intensive, provides an indication of the performance of value indicators. From the results of the analysis together with the proposed evaluation criteria, it is possible to conclude that certain indicators such as MVA, EVA, WEV/BVE and the Q-ratio should be considered as mainstream indicators of value performance. The remaining value indicators such as the profitability index (RONA:WACC and ROE:K_e), and the value index ratios (market value of equity to book value of equity in total and per share and ROE to earnings yield) should be regarded as preliminary indicators of value creation or destruction.

The last part of this section identifies several key pointers related to the linkages between the performance indicators discussed in Chapters 2 and 3 and the trade-off between maximising shareholder value as the governing management objective and enhancing customer value. All the value indicators discussed in this chapter together with a large number of the indicators identified in Chapters 2 and 3 are calculated for the CI and LI groups of enterprises for a three-year upswing and three-year decline phase of the economic cycle.

The ratios identified in Chapters 2, 3 and 4 are statistically analysed in Chapters 7 and 8. The behaviour of the ratios for the CI and LI enterprises over the upswing and decline phases of the economic cycle is analysed as part of the statistical analysis.

Appendix 4: Calculation of value indicators for a CI and an LI enterprise

An illustration of the weighted average cost of capital (WACC) and cost of equity (K_e) calculation used in the BFA-NET database is provided for two enterprises, Engen and Profurn.

		1996	1995	Average
Cost of long-term debt (K_d)*		16,0%	16,0%	16,0%
Cost of equity (K_e):				
Risk-free rate*		15,0%	15,5%	15,3%
Market premium*		6,0%	6,0%	6,0%
		1995/1996		
Beta (risk multiplier)*	Engen	0,9		
	Profurn	1,1		
K_e (Engen)	15,3% + 0,9 × 6,0% = 20,7%			
K_e (Profurn)	15,3% + 1,1 × 6,0% = 22,0%			

Weighted average cost of capital (WACC):

WACC = $(1–L)K_e + L(K_d)(1–t)$, where t = tax rate

L = total debt/total capital (leverage)

Engen (average weight 1995/1996) = 49,2%

Profurn (average weight 1995/1996) = 65,6%

WACC (Engen) = (1–0,5) × 0,2 + (0,5 × (0,2) × (1–0,35)) = 15,7%

WACC (Profurn) = (1–0,7) × 0,2 + (0,7 × (0,2) × (1–0,35)) = 14,4%

* The cost of long-term debt, the risk-free rate and the market premium are determined by E. W. Balderson and applied to the enterprises in the BFA-NET database (see E. W. Balderson, 1993; Bureau for Financial Analysis, 1994).

The figures in the following table are applicable to the value indicators in Table 4.10 for the two enterprises Engen and Protea Furnishers (Profurn). The financial data were obtained from BFA-NET and calculated for all the items that are applicable to the value formulae.

Item of information	Engen	Profurn
Return on total net assets (RONA) (%)	9,0	14,8
Return on total shareholders' interest (ROE) (%)	6,8	19,6
Total capital (R'000)	8 737 000	258 307
Market value (R'000)	8 670 950	422 359
Market value of equity (R'000)	4 383 950	240 771
Book value of debt (R'000)	2 836 000	52 757
Book value of equity (R'000)	3 789 000	137 185
Earnings yield (%)	8,1	11,0
Growth (g) (%)	26,95	16,87
NOPAT (R'000)	453 375	37 986
WACC (%)*	15,7	14,4
Cost of equity (K_e) (%)*	20,8	22,0
Cost of debt (%)*	16,0	16,0
Adjusted assets (R'000)	6 846 000	163 392
Book value of equity per share (c)	2227	36,0
Market value of equity per share (c)	2575	62,0
Beta (risk multiplier)	0,9	1,1
Tax rate (%)	35,0	35,0

* Refer to WACC and K_e calculation in the preceding table

CHAPTER 5

A DISTINCTION BETWEEN CAPITAL INTENSIVE AND LABOUR INTENSIVE ENTERPRISES

5.1 Introduction

The nature of an enterprise generally determines the manner in which it responds to external environmental factors such as fluctuations in the economic cycle as measured by the Gross Domestic Product (GDP). Less favourable trading conditions caused by a general decline in business activity could have significant consequences for both management and shareholders. Various types of performance indicators convey the symptoms of an improving or worsening financial situation in enterprises, which are more or less cyclical in nature.

A distinction could be made between enterprises on the basis of the existing mix of capital and labour. For instance, the mix of capital and labour in CI enterprises would imply that these enterprises are more automated with a lesser focus on the labour intensive nature of the production process. Conversely, enterprises that may generally be considered to be LI would use more labour intensive production processes, with a lesser focus on automated methods of production. For instance, enterprises that are more capital intensive (CI) (e.g. Steel and Allied, and Chemicals, Oils and Plastics) may be affected in a different manner to those which are labour intensive (LI) (e.g. Clothing and Textiles).

Chapter 5 comprises three parts. Part one provides an overview of the research design by highlighting the various phases that form part of the total process. Part two provides an analysis of the economic cycle in order to identify an upswing and decline phase as measured by the GDP. The third part distinguishes between enterprises as CI or LI. This part covers the methodology that is used to select the enterprises required to form part of the analysis and classify them as CI or LI. The outcome of the analysis provides two independent groups of enterprises. The distinction between enterprises as CI or LI is determined on the basis of appropriately defined measures of capital and labour intensity.

5.2 Research design

The research design is a methodical overview of the research methodology and highlights various phases which are conducted during the primary research process to achieve the objective of the study as specified in Chapter 1. A broad overview of the research design is covered in this section. The research design process is illustrated in Figure 5.1 with the aid of a graphic representation.

The research design encompasses two distinct phases. The first phase commences with the need to identify a period of the economic cycle that resembles an upswing period followed by a decline period or vice versa. The upswing or decline period followed on a basis year of zero economic growth. Once the period of the research is established, two independent groups of CI and LI enterprises are compiled from a selection of JSE-listed industrial enterprises. The two groups obtained from the analysis are unrelated and form the basis for the application of the identified individual financial indicators. The merits of the financial indicators are discussed in the preceding chapters and involve five groups of ratios, i.e. traditional profitability, growth, cash flow, value and inflation-adjusted indicators. A comprehensive analysis is conducted (see Chapter 6) to ensure the financial statements of the CI and LI enterprises included in the analysis are valid and appropriately standardised and the ratios selected for inclusion are reliable and accurately calculated. The preceding tasks form the first phase of the empirical analysis.

The second phase of the primary research includes an elaborate statistical analysis that is used to describe the ratio data, determine patterns and behavioural differences between CI and LI enterprises during an upswing and decline phase of the economic cycle. Several statistical techniques such as Exploratory Data Analysis (EDA), non-parametric analysis and profile analysis based on Hotelling's T^2 test are used to analyse the data. The statistical analysis consists of two parts. Part one entails an analysis of the behavioural patterns of the CI and LI enterprises for each ratio based on a single representative measure. Part two analyses the behaviour of the CI and LI enterprises for the ratios based on the individual years of the upswing and decline phases.

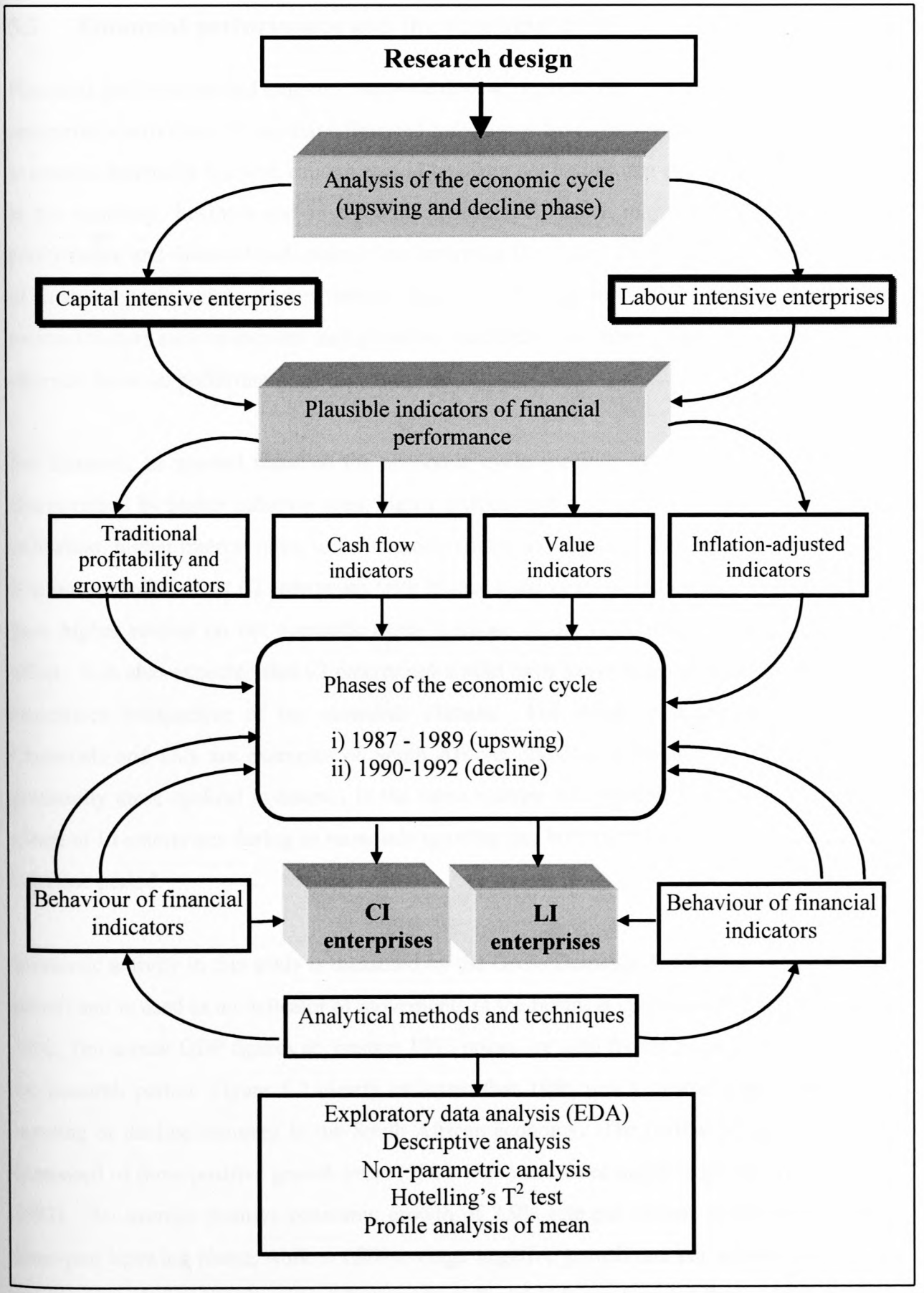


Figure 5.1: A graphic representation of the research design

5.3 Financial performance and the economic cycle

Financial performance and long-term survival depend on more than the nature and scope of an enterprise's activities. Given that a financial indicator is based on accounting information and in essence internally focused, caution should be taken not to discount external factors inherent in the economy, business and investment environment, which may impact on the relative performance and financial well-being of an enterprise (De Jager, 1997: 63). The measurement of financial performance during various phases of the economic cycle, together with other external factors such as industry and globalisation effects, may have a significant effect on the ultimate financial performance of the enterprise.

For instance, an upward phase in the economic cycle (positive economic growth) is often characterised by higher inflation rates, higher product and commodity prices, higher capacity utilisation, higher interest rates, lower unemployment and higher labour costs. Consequently, it is not unrealistic that CI enterprises with higher fixed costs would expect, for instance, to have higher returns on net operating assets because of the financial and operating gearing effect. It is also expected that CI enterprises would have lower asset-turnover ratios than LI enterprises irrespective of the economic climate. For instance, sectors such as Steel, Chemicals and Oils are examples of South African classified economic sectors, which are potentially more cyclical in nature. In the same manner it is possible to analyse the cyclical nature of LI enterprises during an economic upswing and both the CI and LI enterprises during a decline period.

Economic activity in this study is measured by the Gross Domestic Product (at constant 1995 prices) and is used as an indicator of movements in the business cycle over the period 1987 to 1992. The annual GDP figures at constant 1995 prices are used for the purposes of identifying the research period. Figure 5.2 clearly indicates that 1986 was a neutral year in which no upswing or decline occurred in the South African economy. The review period is therefore composed of three positive growth years (1987-1989) and three negative growth years (1990-1992). An average positive economic growth of 2,9% rate per annum occurred during the three-year upswing phase, while a 1,2% average negative growth rate per annum occurred in the economy during the three-year decline phase (South African Reserve Bank, 2000: S-146). The period for the research is selected for the reasons outlined below.

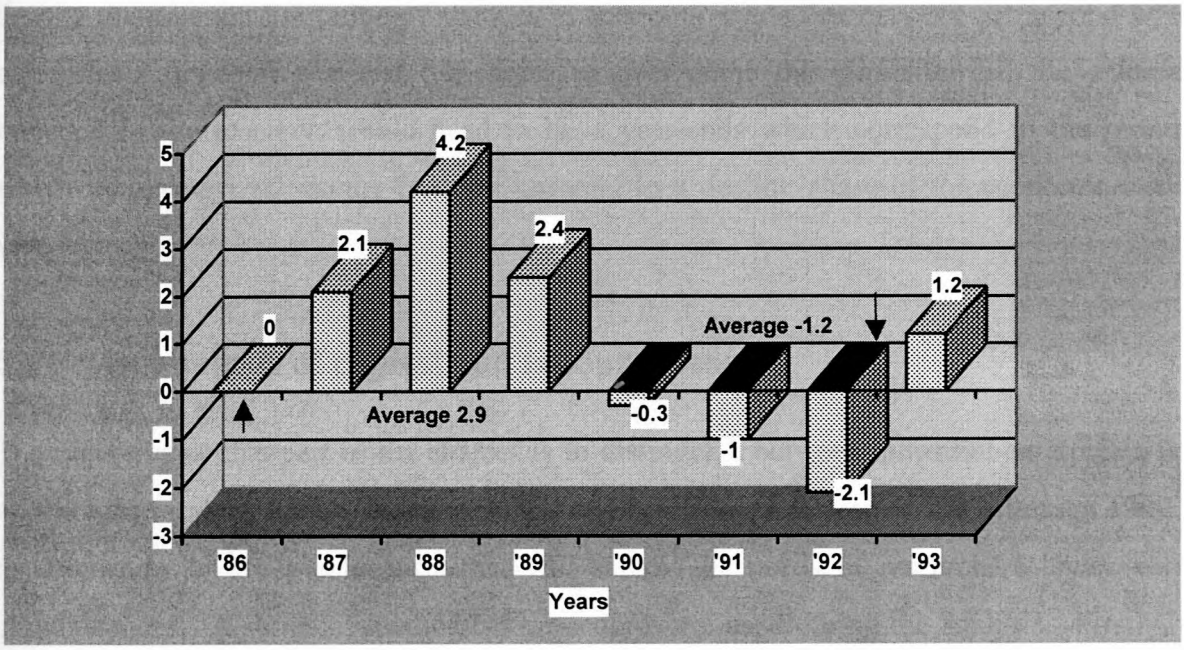


Figure 5.2: Economic cycle as reflected by changes in the Gross Domestic Product (at constant 1995 prices) (**Source**: South African Reserve Bank, 2000: S-146)

Prior to 1986 the selection of an upswing and decline phase would have been impractical, firstly due to the immediate preceding upswing and decline phases consisting only of one and two years respectively and, secondly, it would not have been possible to calculate the cash flow ratios for an enterprise. The BFA-NET database that is used in the research only provides cash flow statements for several enterprises from 1986 and the majority of the selected enterprises from 1987. The upward phase (1993-1995) of the economic cycle after 1992 also extends only over two complete years (South African Reserve Bank, 2000: S-146) prior to the commencement of the research.

It should be noted that the changeover between an upswing and decline phase or vice versa generally occurs within a calendar year (see South African Reserve Bank, 2000: S-145). However, many companies' year-ends would not necessarily correspond to the changeover from an upswing to a decline phase or vice versa. For instance, an enterprise may stipulate its financial year-end in March of a particular year. The economic cycle, however, changes from an upswing phase to a decline phase in September of that year. This implies that a certain period of the enterprise's financial year could possibly fall within, for example, the upswing period and the latter period in the decline phase. Notwithstanding this, the annual GDP figures are used to distinguish between an upswing and decline phase in the economic cycle

despite the inherent limitation of changes in economic cycle that may not correspond with an enterprise's financial year-end. In order to over come this limitation all the enterprises included in the research would need to have year-ends which correspond to the month in which the changeover occurs from an upswing to a decline phase of the economic cycle or vice versa.

5.4 An analysis of capital and labour intensity

The objective of this part of the chapter is to distinguish between industrial enterprises listed on the Johannesburg Stock Exchange (JSE) as CI or LI over the period 1987 through 1992 and to determine an acceptable basis that will satisfy the needs of researchers under various circumstances. A series of methodical procedures are used during the analysis. Firstly, two financial measures are considered that could appropriately define enterprises as either CI or LI on the basis of fixed assets, total net assets and number of employees. Secondly, industrial enterprises listed on the JSE are selected with certain provisos, to which the proposed measures are applied. The analysis is supported by the use of descriptive statistics. The two measures are analysed individually and simultaneously in order to distinguish between CI and LI enterprises. On the basis of Euclidean Distance measures calculated for each enterprise and its position on a scatterplot in one of four quadrants, the enterprises are classified as either CI or LI for analytical and research purposes.

5.4.1 Measures of capital intensity

Capital intensity can be defined in a variety of ways and measured at a range of scales. The term is originally a microeconomics concept, which depends on internal and external factors such as production technology, price of labour and capital requirements (Joos and Ooghe, 1994: 10). If a process uses a large labour component and very little capital, it is said that the method of production is LI. When capital is substituted for labour in a manner, which keeps output constant, the method of production is more CI. The most CI method of production is therefore one where almost all the labour has been replaced by (probably highly automated) capital (Begg, Fischer and Dornbusch, 1984: 219). Furthermore, Lammings and Bessant (1990: 31) describe a CI enterprise as one in which there is a high level of capital investment – for example, in automated plant – and a low level of labour intensity.

In terms of the above description of capital intensity, the following specific measures are used to express the level of capital intensity. In the definition of capital intensity Lammings and Bessant (1990: 31) use the amount of capital employed compared to the amount of labour employed as a measure. Joos and Ooghe (1994: 11) suggest fixed productive assets to the number of employees as a measure of capital intensity. Booth (1991) uses operating leverage (fixed operating costs: variable operating costs) as a measure of capital intensity in order to determine the association between risk and capital intensity. Brigham and Capenski (1991: 933) refer to capital intensity as the amount of assets required per dollar of sales. Note that this definition of capital intensity indicates the inverse of the total assets to turnover ratio. Hamman (1988) considers four traditional measures of capital intensity, viz. net fixed assets to total net assets, sales to total net assets, sales to depreciation and depreciation to sales. He concluded that the economic definition of capital intensity, i.e. the capital-output ratio, and the four traditional measures indicate significant parallels.

It appears that in the context of the general description of capital intensity and the specific measures used by various authors to express the level of capital intensity in an enterprise two issues are highlighted, namely, the level of capital investment and level of utilised labour. A high level of capital investment in an enterprise is exhibited by a large contribution of net fixed assets to total net assets (NFA:TA). This indicator represents net fixed assets of the enterprises as a ratio of the monetary value of total net assets. In Chapter 2 reference is made to the high levels of inflation over the period of the research. Fixed assets in particular, which usually have a long economic lifespan, are prone to inflation which slowly erodes their current value. As a consequence enterprises revalue fixed assets in order to account for higher replacement values. As Hamman (1988) indicates, some enterprises do not revalue their assets, others revalue on a periodic basis, while others have a rigorous programme of revaluation. In order to compare the total net assets and net fixed assets of an enterprise, either no enterprise must revalue their fixed assets, or all enterprises should do so using the same method and revalue at the same point in time. The latter option is not practically possible and therefore where possible the revaluation is subtracted from total net assets and net fixed assets.

Net total assets include net fixed assets, other assets (e.g. investments) and current assets. Intangible assets such as goodwill, cost of control and patents are not included as part of total

net assets. It may be assumed that the higher the percentage contribution of NFA:TA the more CI the nature of an enterprise's activities, if only this ratio is considered.

Several of the specified indicators also make provision of the inclusion of labour (employment) intensity as a factor to consider when defining capital intensity. The number of employees is also often used as a measure of the labour intensive nature of an enterprise's activities. A second ratio therefore considered in this study is the net fixed assets to number of employees (NFA:EMP), which represents the money value of fixed assets per employee. NFA:EMP is not unlike the measure proposed by Joos and Ooghe (1994) and Lammings and Bessant (1990). An enterprise which exhibits a low ratio of NFA:EMP on a single classification basis would generally be regarded as being more LI.

Both the NFA:TA and NFA:EMP ratios are reported in the literature as single measures that can be used to define capital intensity. In the context of this study, which entails distinguishing between CI and LI enterprises, the NFA:TA ratio would be sufficient to capture the essence of the capital intensive nature of an enterprise's production processes. It provides an absolute indication of the level of capital intensity in the enterprise. The net fixed assets represent the productive physical means used by the enterprise to produce products and services in the same manner as the economy uses physical capital as one of the production factors to achieve a level of output. If the sole focus of the research were the capital intensive nature of production, this measure would be adequate and provide a useful indication of the capital-intensive nature of the enterprise's activities.

However, the literature also indicates that the ratio of fixed productive assets to the number of employees is used to determine capital intensity. In addition, the NFA:TA and fixed productive assets to number of employees are different measures used to determine the same phenomenon. Nevertheless, it could be argued that the NFA:TA ratio does not capture the level of labour intensity in production. It is possible that one could assume that the more capital intensive the production process, the less reliant an enterprise is on labour. Notwithstanding, an enterprise could have a high ratio of NFA:TA, while employing a large labour force. The need exists to identify a measure which also captures the labour component of an enterprise's production process more explicitly. The NFA:TA ratio implies that labour is considered when the level of capital intensity in an enterprise is determined. However, this

is not explicitly indicated in the ratio. For this reason the NFA:EMP ratio which is used as a measure of capital intensity in the literature is also considered in this study as a measure that captures the labour intensity of an enterprise's production process. Again this measure implies that a production process that uses large amounts of labour does not explicitly indicate how capital intensive the process is. A low ratio implies that the production process is therefore less capital intensive.

The NFA:TA and NFA:EMP ratios should be considered as different concepts as they measure different and not necessarily opposite aspects of an enterprise's operations. It is expected that these measures would correlate, but would vary independently across enterprises. On the basis of this argument the measures NFA:TA and NFA:EMP are selected from the literature and used in this study for the purposes of defining capital intensity on the one hand and labour intensity on the other. The relative importance of both capital intensity and labour intensity in a production process is therefore highlighted by the use of the measures in combination, but on an independent basis (see Bloom, Lambrechts and Le Roux, 1998).

5.4.2 Establishing the group of JSE-listed companies for possible inclusion in the analysis

All enterprises listed in the Industrial Sector of the JSE are considered for inclusion in the research, except the Industrial Holdings sector. The latter is excluded due to its primary characteristic of consisting of holding enterprises, which are not generally directly involved in business operations. Preliminary analysis of financial information also confirms that several other enterprises not necessarily included in the Industrial Holdings sector are primarily holding enterprises or pyramids. Enterprises in the development and venture capital sectors are also excluded due to their unpredictability. Enterprises from the following JSE-classified sectors are provisionally included: Beverages, Hotels and Leisure; Building, Construction and Allied; Chemicals, Oils and Plastics; Clothing and Textiles; Electronics and Electrical; Engineering; Food; Furniture and Household; Motor; Paper and Packaging; Pharmaceutical and Medical; Printing and Publishing; Steel and Allied; Wholesale and Retail and Transport.

The enterprises that provisionally qualify for inclusion in the study had to be listed by 1986. Other criteria that precluded enterprises from inclusion in the analysis are:

- Insolvency during the period under review
- Provisional liquidation
- Delisting during the period under review
- Incomplete information on the enterprise as displayed in the standardised BFA-NET database, such as missing financial years. This situation is the result of a change to the financial year-end of an enterprise, which would mean a lack of financial statements and information for that particular year.

After the exclusion of holding companies a total of 359 enterprises were listed by the end of 1992. A total of 51,8% of the enterprises, i.e. listed by the end of 1992, were not listed by 1986 as required for the purposes of this study, and they are therefore not considered. A further 31 enterprises were excluded on the basis of insolvency, provisional liquidation or incomplete annual information. An initial analysis indicates that 142 enterprises could be included in the group of enterprises for further research. Table 5.1 provides a breakdown of the number of enterprises per JSE-classified sector at the end of 1992 as well as the provisional number of enterprises in each sector included in the research after applying the above-mentioned criteria. The sectors that contribute a large number of enterprises to the provisional list are Clothing and Textiles (20), Engineering (17) and Wholesale and Retail (19).

Table 5.1: Number of enterprises included in the provisional analysis per JSE-classified sector in 1992

JSE-classified sector	Total number of enterprises in sector	Number of enterprises listed after1986	Provisionally included
Beverages, Hotels and Leisure	24	18	5 (20,8)*
Building, Construction and Allied	28	13	13 (46,4)
Chemicals, Oils and Plastics	10	6	6 (60,0)
Clothing and Textiles	45	26	20 (44,4)
Electronics and Electrical	44	28	15 (34,0)
Engineering	32	---	17 (53,1)
Food	18	---	15 (83,3)
Furniture and Household	14	11	5 (35,7)
Motor	15	9	5 (33,3)
Paper and Packaging	21	12	8 (38,0)
Pharmaceutical and Medical	16	11	5 (31,2)
Printing and Publishing	11	9	4 (33,3)
Steel and Allied	4	2	2 (50,0)
Wholesale and Retail	64	32	19 (29,6)
Transport	13	9	3 (23,0)
TOTAL	**359**	**186 (51,8)**	**142 (39,5)**

* The percentage of enterprises contributed from each sector as at 31 December 1992 is indicated in parenthesis

5.4.3 NFA:TA and NFA:EMP analysis of provisionally selected enterprises

Data pertaining to net fixed assets, total net assets and number of employees that are required to calculate the ratios were obtained from the Johannesburg Stock Exchange Handbook and the Bureau for Financial Analysis (University of Pretoria) database of JSE listed companies (Bureau for Financial Analysis, 1997). An average of the net fixed assets and total net assets (excluding intangibles) is used representing the period 1987 to 1992.

The employment figures at the financial year-end of each enterprise were averaged for the period 1987 to 1992. This approach is used in order to eliminate fluctuations in employee numbers, which are difficult to adjust during a decline in the economy. Several sources were consulted in order to obtain the employment figures for each enterprise. These include the

Bureau for Financial Analysis, BFA-NET, 1997; McGregor's Stock Exchange Handbook (various editions) and in certain instances the financial statements of the enterprises were also consulted. In addition, the period for which persons are employed and whether or not they are, for instance, semi-permanent would also affect the employee figure of the enterprise. For the purposes of further analysis, the NFA:TA and NFA:EMP ratios are considered on an individual basis in order to obtain a single measure of capital intensity and labour intensity. Furthermore, on the basis of the individual application results, the ratios could also be analysed simultaneously on a two-dimensional basis in order to distinguish between CI and LI enterprises.

The scale disparity between the data elements of the financial indicator variables NFA:TA and NFA:EMP requires a transformation of the variables when both measures are combined into a single measure of capital/labour intensity. Furthermore, Jordaan, Smit and Hamman (1994: 65) indicate that the distribution of many financial indicator variables deviate from normality. In addition, several statistical techniques assume or require that the data be approximately normally distributed for analytical purposes (Foster, 1986: 102). As a consequence a need arises to analyse the characteristics of the variable, which include its distribution.

A normal probability plot for NFA:TA did not indicate substantial significant deviations from normality. The Kolmogorov-Smirnov (K-S) test was used to ascertain whether or not a variable is approximately normally distributed. This measure is preferred to the chi-square test if the sample is relatively small (Jordaan *et al.*, 1994: 68). Furthermore, if the K-S d-statistic is significant, then the hypothesis that the respective distribution is normal should be rejected (Statsoft, 1998). The K-S test statistic has a d-value of 0,08293 with $p>0,20$, which suggested no sufficient reason for rejecting the null hypothesis of underlying normality. The standardisation procedure $\frac{x_i - \bar{x}}{s}$ was applied to this variable, effectively converting its mean to zero and its standard deviation to one. In the above formula, x_i denotes the NFA:TA ratio of enterprise (i), $\bar{x}$ the arithmetic mean of all enterprises and (s) the corresponding standard deviation. This standardisation procedure was necessary since the two ratios which are to be combined into a single measure of CI or LI intensity have markedly different scales. Perusal of Table 5.2 shows that NFA:TA has a standard deviation of 0,1928 while that of NFA:EMP is 74,3470.

A normal probability plot for the NFA:EMP variable indicates the presence of possible outlier and/or influential data values, which appears to cause significant skewness in the data. The Kolmogorov-Smirnov (K-S) test for this variable has a d-statistic of 0,26867 with $p<0,01$, indicating that the null hypothesis of underlying normality should be rejected. A logarithmic transformation (to base 10) was applied to this variable in order to bring the outlier values and other data points closer together. A normal probability plot indicated that the transformed variable offers a more acceptable representation of normality, although it still appears to be slightly skewed to the right. A K-S d-statistic of 0,0478 with $p>0,20$ for the log (NFA:EMP) is obtained, which suggests that after the transformation of the NFA:EMP there is insufficient reason to reject the null hypothesis that log (NFA:EMP) is normally distributed. The same procedure applied previously was also used to standardise the log (NFA:EMP) variable to have a mean of zero and standard deviation of one.

Table 5.2: Descriptive statistics for NFA:TA, NFA:EMP and log (NFA:EMP) variables

Variable	Valid N	Mean	Median	Standard deviation	Quartile deviation	Standardised Skewness Coefficient	Standardised kurtosis coefficient
NFA:TA	142	0,3183	0,2965	0,1928	0,1334	0,8535	0,5208
NFA:EMP	142	47,6994	24,3500	74,3470	18,6950	4,4952	26,6059
Log(NFA:EMP)	142	1,4107	1,3865	0,4641	0,3042	0,2797	0,0871

In addition to the usefulness of the hypothesis test illustrated in the above sections, descriptive statistics could also be used to further describe the characteristics of the NFA:TA, NFA:EMP and log (NFA:EMP). Firstly, the mean and the median of the NFA:TA are almost identical (see Table 5.2), which together with the standard deviation and the quartile deviation indicates that a large number of the enterprises are concentrated around the centre of the distribution. Conversely, a large difference exists between the mean and median figures for the NFA:EMP. The standard deviation and the quartile deviation further indicate that the enterprises have varied NFA:EMP ratios.

Furthermore, a standardised skewness coefficient outside the range of –2 and +2 indicates significant departures from a normal distribution (Jordaan *et al.*, 1994: 67). Kurtosis, on the other hand, also reveals how flat or steep a distribution is relative to the normal distribution.

For a normal distribution the kurtosis coefficient is zero. A data series that has an approximately normal distribution also has a standardised kurtosis coefficient within the range of –2 and +2. Given the parameters mentioned previously, the skewness and kurtosis statistics in Table 5.2 indicate that the NFA:TA variable does not indicate significant deviations from normality. In contrast, the NFA:EMP variable shows significant departures from normality, with both the skewness and kurtosis statistics falling outside the specified parameters. However, after the log transformation of the NFA:EMP both the mean and median statistics indicate similar values, while the skewness and kurtosis statistics both fall within the specified limits.

5.4.4 A distinction between CI and LI enterprises

The standardised NFA:TA and the standardised (log NFA:EMP) ratios of the 142 enterprises provisionally included in the analysis are represented in a scatterplot given in Figure 5.3. The standardised NFA:TA is represented on the horizontal axis and the standardised log NFA:EMP is represented on the vertical axis. A large standardised NFA:TA measure implies a high capital intensity, while a small standardised NFA:TA measure implies a low capital intensity. Conversely, a large standardised (log NFA:EMP) measure implies a low labour intensity, while a small standardised (log NFA:EMP) measure implies a higher labour intensity. It is possible to deduce from this description that CI enterprises should have positive values for both measures, while LI enterprises have negative values for both measures.

On the basis of these measures the enterprises are "scattered" on the plot on the basis of their position relative to the group mean of each of the two measures. It is clear from Figure 5.3 that a large number of the enterprises are concentrated around the mean value of zero of the two measures and furthermore appears to be scattered around a diagonal line which is apparent in the scatterplot. The scatterplot also shows that a fairly large positive correlation (r = 0,72) exists between the two variables. However, a correlation of 0,72 implies that 48,16% of the variation in one of the variables is not accounted for by the other one through a linear regression relationship. Hence it can be argued that a single measure which considers the capital intensive nature of an enterprise relative to its labour intensity should be based on both these variables.

The scatterplot in Figure 5.3 is divided into four quadrants.

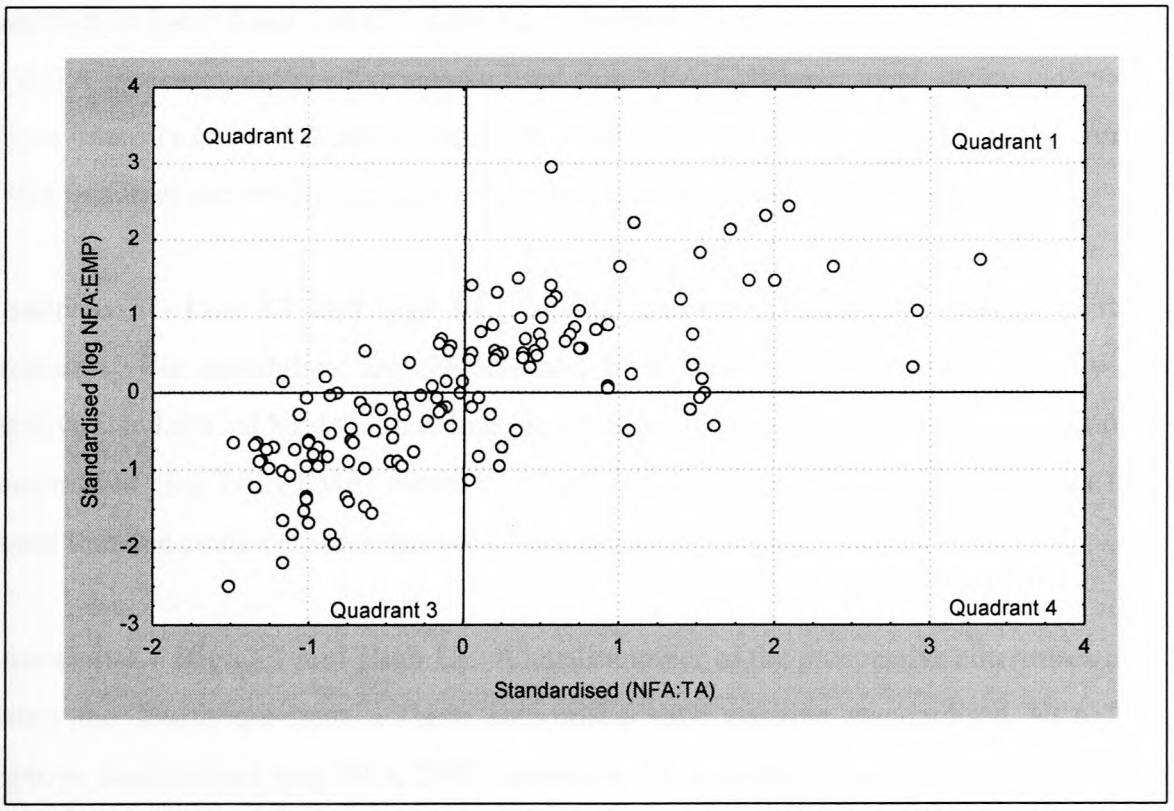


Figure 5.3: Scatterplot of standardised NFA:TA and standardised (log NFA:EMP) of the enterprises provisionally included in the analysis

Perusal of the quadrants in the scatterplot indicates the following: the various enterprises in quadrant one are scattered across the quadrant, while a relatively large number concentrate around the mean of the two axes within approximately one and a half standard deviations from the mean. In quadrant three the majority of the enterprises are also bunched together within two standard deviations of the mean. The enterprises in quadrants two and four are positioned relatively close to the mean of either one or both of the classification measures. A more specific description of the quadrants is provided in the following discussion.

Quadrant 1 - High CI and low LI: This quadrant includes enterprises with a high capital intensity and conversely a low labour intensity. These enterprises have a predominantly high standardised NFA:TA with corresponding high standardised (log NFA:EMP) ratios. Both the standardised measures are positive, which indicates that the specific enterprises have standardised NFA:TA and standardised (log NFA:EMP) measures that are larger than the mean.

Quadrant 2 – Low CI and Low LI: Enterprises positioned within this quadrant could be classified as low LI and low CI. Low CI enterprises in this case have negative standardised NFA:TA measures and positive standardised (log NFA:EMP) measures, which indicate a low labour intensity and a low capital intensity. With the exception of one case the 12 enterprises in this quadrant are within one standard deviation of the mean for both measures.

Quadrant 3 - Low CI and high LI: A large number of enterprises position within this quadrant. The enterprises are characterised by a relatively low capital intensity with a negative standardised NFA:TA measure. In addition, the enterprises also have a high negative standardised (log NFA:EMP) measure, which together with their classification as low CI, means that one could consider them as LI enterprises.

Quadrant 4 – High CI and High LI: A small number of the prospective enterprises position within the fourth quadrant. These enterprises have positive standardised NFA:TA and negative standardised (log NFA:EMP) measures. It is evident from the scatterplot that two small "clusters" of enterprises could be identified which require further elaboration. Several enterprises are grouped close to the mean of the standardised (log NFA:EMP) measure, but are positioned approximately 1,5 standard deviations from the mean of the standardised (NFA:TA). The second group of enterprises in the one instance is positioned close to the mean of the standardised NFA:TA and approximately one standard deviation from the mean of the standardised (log NFA:EMP) measure.

5.4.4.1 Single-measure classification: standardised NFA:TA

In order to distinguish between the enterprises on the basis of the standardised NFA:TA, the scatterplot in Figure 5.3 should be considered in the following manner. Firstly, the horizontal axis, which represents the standardised NFA:TA, is used, while the vertical axis representing the standardised (log NFA:EMP) is ignored. For a single-measure classification, quadrants one and four and quadrants two and three are combined to provide a one-dimensional view of the enterprises on the basis of the standardised NFA:TA measure. This amounts to projecting each data point orthogonally onto the horizontal axis.

The enterprises in quadrants one and four have positive standardised NFA:TA values on the basis of having a larger value than the mean of the measure. Conversely, enterprises with negative standardised NFA:TA values are positioned in quadrants two and three and therefore have values that are smaller than the mean of this measure. The combined quadrants one and four would therefore lead to positively signed scale values, while the combination of quadrants two and three would lead to negatively signed values. Secondly, the absolute value of an enterprise's scale value provides an indication of the intensity of CI behaviour. This scale can now easily be transformed into a percentile scale. The relative intensity of the capital intensive versus labour intensive nature of a new enterprise can now simply be evaluated by comparing its scale value to the percentile scale. Scale values in the neighbourhood of zero indicate enterprises which are not predominantly CI or LI. Users wanting to distinguish between a group of predominantly LI enterprises and a group of predominately CI enterprises may do so by considering the x% enterprises having the largest scale values and the x% enterprises with the smallest scale values.

5.4.4.2 Single-measure classification: standardised (log NFA:EMP)

The same procedure applied above could be used to distinguish between the enterprises on the basis of the standardised (log NFA:EMP) measure. In this instance the scatterplot is viewed by considering the position of the enterprises in relation to the vertical axis, while the horizontal axis is ignored. Quadrants one and two, and three and four are combined to give a one-dimensional view of the enterprises on the basis of the standardised (log NFA:EMP) measure by projecting each data point orthogonally onto the vertical axis. The enterprises in quadrants one and two have positive standardised (log NFA:EMP) scale values on the basis of having a larger value than the mean of the variable. Conversely, enterprises with negative standardised (log NFA:EMP) values are positioned in quadrants three and four and therefore have values that are smaller than the mean.

The absolute value of an enterprise's scale value provides an indication of the intensity of LI behaviour. This scale can also easily be transformed into a percentile scale. The relative intensity of the capital intensive versus labour intensive nature of a new enterprise can now simply be evaluated by comparing its scale value to the percentile scale. Scale values in the neighbourhood of zero indicate enterprises which are not predominantly CI or LI. Users

wanting to distinguish between a group of predominantly LI enterprises and a group of predominately CI enterprises may do so by considering the x% enterprises having the largest scale values and the x% enterprises with the smallest scale values.

5.4.4.3 Measures used simultaneously: standardised NFA:TA and standardised (log NFA:EMP)

In addition to the classification of enterprises on a one-dimensional basis, the enterprises could also be classified as CI or LI on the basis of both measures simultaneously. This is accomplished, by first calculating the Euclidean Distance for each enterprise between its location on the scatterplot and the point (0;0). The Euclidean Distance for each enterprise is calculated in the following manner:

$$\sqrt{(Std\ NFA:TA_i)^2 + (Std\ Log\ NFA:EMP_i)^2} \quad for:\ i = 1.....142$$

The calculated Euclidean Distance is assigned a positive sign for enterprises that are positioned in quadrant one, while enterprises that are positioned in quadrant three are assigned a negative sign. CI enterprises per definition position in quadrant one due to having a high standardised NFA:TA ratio and a high standardised (log NFA:EMP) measure, which implies a high capital intensity and a low labour intensity. Conversely, LI enterprises per definition are positioned in quadrant three and have a low standardised (log NFA:EMP) ratio and low standardised NFA:TA ratio, which implies a high labour intensity and low capital intensity.

The Euclidean Distance measure is transformed into a scale in order to distinguish between LI and CI enterprises. This is achieved by applying the following rule:

1. If both the standardised (NFA:TA) and the standardised (log NFA:EMP) are positive, the Euclidean Distance is multiplied by +1.
2. If both the standardised (NFA:TA) and the standardised (log NFA:EMP) are negative, the Euclidean Distance is multiplied by –1.

However, if the standardised (NFA:TA) is positive and the standardised (log NFA:EMP) is negative or visa versa, then the following applies:

1. If the absolute value of standardised (NFA:TA) is larger than the absolute value of the standardised (log NFA:EMP), the Euclidean Distance is multiplied by one and is accorded the sign of the standardised (NFA:TA).
2. If the absolute value of standardised (NFA:TA) is smaller than the absolute value of the standardised (log NFA:EMP), the Euclidean Distance is multiplied by one and accorded the sign of the standardised (log NFA:EMP).

This scale constructed from the Euclidean Distance associated with two ratios, which measure different aspects of the production process, differentiates between CI and LI enterprises. The scale values for enterprises included in the analysis range from –2,8957 to +3,7562. On the basis of this scale a positive value indicates a CI enterprise and a negative value a LI enterprise. An enterprise is considered more CI the larger (or more positive) this scale value becomes and more LI when the scale value becomes smaller (or more negative). This scale can now easily be transformed into a percentile scale. The relative intensity of the capital intensive versus labour intensive nature of a new enterprise can now simply be evaluated by comparing its scale value to the percentile scale. Scale values in the neighbourhood of zero indicate enterprises which are not predominantly LI or CI. Users wanting to distinguish between a group of predominantly LI enterprises and a group of predominately CI enterprises may do so by considering the x% enterprises having the largest scale values and the x% enterprises with the smallest scale values.

For instance, it is possible to consider the upper and lower quartiles of the scale values. According to the construction of the scale the upper 25% of the scale values represent CI enterprises and the lower 25% of the scale values LI enterprises. In order to demonstrate the use of the scale, consider the upper 25% of the scale values that represent predominantly CI enterprises and the lower 25% that represent predominantly LI enterprises. This criterion corresponds to the cut-off values –0,95 and +0,95. Perusal of Figure 5.3 indicates that not all the enterprises are positioned in quadrants one and three. Only one of the enterprises positioned in quadrant two has a real value outside the bounds of –0,95 to +0,95. This enterprise can now be labelled LI on the basis of having a very small standardised NFA:TA value, while its position is close to the mean of the standardised (log NFA:EMP) measure.

On the other hand, several cases with scale values outside the interval [–0,95 ; 0,95] are identified in quadrant four. One group of four enterprises is labelled CI on the basis of being close to the mean of the standardised (log NFA:EMP) measure, while also exhibiting a large standardised NFA:TA measure, which implies a high capital intensity. Another group of enterprises in this quadrant position is relatively close to the mean of the standardised NFA:TA, but in turn exhibits high standardised (log NFA:EMP) values. A single enterprise, by virtue of being close to the mean of the one measure and exhibiting a high value for the other, can be considered a LI enterprise. The remaining enterprises in quadrant four have scale values within the interval [–0,95 ; 0,95] and are therefore not considered.

Additional analysis is conducted in support of the use of a measure that combines the standardised NFA:TA and standardised (log NFA:EMP). This is accomplished on a similar basis to the percentile selected by the user in the situation discussed above. The upper and lower 25% of the scale are selected and the number of enterprises that occur in the upper and lower specified bounds of the combined measure (EC) and the standardised NFA:TA are determined. The same procedure is applied when enterprises which form part of the combined measure and standardised (log NFA:EMP) are compared. Furthermore, the number of enterprises that occur in the upper and lower 25% bounds of all three measures are also determined.

An analysis of the upper quartile indicates that 83,3% of the enterprises occur in both the EC and standardised NFA:TA, while 88,8% of the enterprises occur in both the EC and standardised (log NFA:EMP). In the lower 25% of the scale for each measure, 93,9% of the enterprises occur in both the EC and standardised NFA:TA, while 75,5% of the enterprises occur in both the EC and standardised (log NFA:EMP). However, if the enterprises are compared across all three measures, i.e. standardised NFA:TA, standardised (log NFA:EMP) and the EC for the upper and lower limits as defined above, the following results are obtained. An analysis of the upper 25% bound of the scale indicates that 69,7% of the enterprises form part of all three measures, while 66,7% form part of all three measures for the lower 25% bound. A list of the enterprises together with their scale values for each of the measures is provided in Appendix 5A.

5.4.5 Results of the analysis

The proposed standardised NFA:TA and standardised (log NFA:EMP) measures are used to differentiate between CI and LI enterprises. As indicated previously, these measures could be used to distinguish between the enterprises on a one- and/or two-dimensional basis. The results of the procedures applied above are discussed in the following sections.

By using the standardised NFA:TA measure and the application of the criteria discussed previously, it is possible to select 37 of the provisional number of enterprises with a standardised NFA:TA value outside the interval [–1,0 ; 1,0]. Furthermore, 20 or 54% of the enterprises included on this basis could be considered as low CI, while 17 or 46% of the enterprises are inclined to indicate a high capital intensity. The results are highlighted in Table 5.3.

Furthermore, it is also possible to distinguish between the enterprises on the basis of the standardised (log NFA:EMP) measure. This classification, which is similar to the previous one-dimensional approach of using NFA:TA to distinguishing between the enterprises, indicates that 32 enterprises have a standardised (log NFA:EMP) value outside the interval [–1,0 ; 1,0]. A total of 19 or 59% of the enterprises are inclined to exhibit a low labour intensity, while 13 or 41% of the enterprises could be considered to have a high labour intensity. The results are highlighted in Table 5.3.

Table 5.3: A distinction between enterprises on the basis of separate standardised NFA:TA and the standardised (log NFA:EMP) measures

Variable	Total number of enterprises with a standardised score outside [–1,0 ; 1,0]	Number of LI enterprises	Number of CI enterprises
NFA:TA	37	17 (46)*	20 (54)
Log NFA:EMP	32	19 (59)	13 (41)
Total	69	36	33

* The percentage contribution of LI and CI enterprises to the total for each measure is indicated in parentheses

As discussed previously, it is also possible to use the standardised NFA:TA and standardised (log NFA:EMP) measures simultaneously. The distinction between the enterprises would therefore be based on a two-dimensional classification. Using the base-line criteria discussed in section 5.4.4.3, enterprises had to have a Euclidean Distance of larger than 0,95 in order to be classified as either LI or CI. After analysing the position of each enterprise on the scatterplot, it is possible to classify 69 enterprises on the basis of the combined measure. CI and LI groups comprising 33 (48%) and 36 (52%) enterprises respectively are obtained from the application of the above-mentioned criteria. Included in the 33 CI group are four enterprises in quadrant four included on the basis of a high capital intensity. A single enterprise in quadrant two and one in quadrant four are included in the LI group on the basis of a high labour intensity.

Table 5.4 indicates the total number of enterprises per quadrant on the basis of both the simultaneous use of the standardised NFA:TA and standardised (log NFA:EMP) measures. An indication is also provided of the number of enterprises which exhibit capital intensity, but at the same time labour forms a significant part of the operation. The enterprises in each quadrant that have an Euclidean Distance of smaller than 0,95 and not included in the analysis are also indicated in Table 5.4. Quadrant one represents CI enterprises and quadrant three LI enterprises with scale value of larger than 0,95 and smaller than –0,95 respectively.

Table 5.4: A distinction between enterprises included in the analysis on the basis of the Euclidean Distance and their position on the scatterplot

	Total number of enterprises per quadrant	Number of enterprises with an Euclidean Distance of > 0,95	Number of enterprises with an Euclidean Distance of <–0,95
Quadrant 1*	54	29	25
Quadrant 2	13	1**	12
Quadrant 3*	65	34	31
Quadrant 4	10	5***	5
TOTAL	**142**	**69**	**73**

* Five enterprises in quadrant one and eight enterprises in quadrant three could not be included due to limitations of the financial data.

** A single enterprise in quadrant two has an Euclidean Distance of larger than 0,95 and is classified on the basis of having a low CI value, while together with its position close to the mean of the standardised (log NFA:EMP) measure, it is considered LI.

*** Five enterprises in quadrant four have Euclidean Distances of larger than 0,95 and are considered special cases. Four of the enterprises are classified CI on the basis of being close to the mean of the standardised (log NFA:EMP) measure, while also exhibiting a large standardised NFA:TA measure, which implies a high capital intensity. A single enterprise in this quadrant is positioned close to the mean of the standardised NFA:TA, but in turn exhibits a high standardised (log NFA:EMP) value. By virtue of being close to the mean of the one measure and exhibiting a high value for the other, it can be included as a LI enterprise.

In the context of the above results, the final classification of an enterprise as CI or LI is based on a combination of the standardised NFA:TA and standardised (log NFA:EMP) as this provides more information on the level of capital and labour intensity, which is useful for additional financial performance analysis. Table 5.5 indicates the contribution of each sector to the inclusive number of 69 CI and LI enterprises. Building, Construction and Allied contributes 24,2% of the enterprises, followed by Chemicals, Oils and Plastics with 15,1%, while Clothing and Textiles and Beverages, Hotels and Leisure contribute 12,1% of the enterprises to the CI group.

Conversely, Clothing and Textiles contributes 30,5% of the enterprises followed by Wholesale and Retail with 25,0% to the LI group, while Furniture and Household contributes 11,1% of the enterprises. A list of the enterprises together with their scale values based on the Euclidean Distance and their JSE sector classification is provided in Appendix 5B.

Table 5.5: The number of enterprises classified in the two disaggregated groups of capital intensive and labour intensive enterprises

JSE-classified sector	Capital intensive	Labour intensive
Beverages, Hotels and Leisure	4 (12,1)[1]	*****
Building, Construction and Allied	8 (24,2)	4 (11,1)
Chemicals, Oils and Plastics	5 (15,1)	*****
Clothing and Textiles	4 (12,1)	11 (30,5)
Electronics and Electrical	1 (3,0)	3 (8,3)
Engineering	1 (3,0)	1 (2,7)
Food	3 (9,0)	1 (2,7)
Furniture and Household	*****	4 (11,1)
Motor	1 (3,0)	1 (2,7)
Paper and Packaging	1 (3,0)	*****
Pharmaceutical and Medical	*****	*****
Printing and Publishing	*****	1 (2,7)
Steel and Allied	2 (6,0)	*****
Wholesale and Retail	1 (3,0)	9 (25,0)
Transport	2 (6,0)	1 (2,7)
Sub-total	33 (47,8)	36 (52,2)
TOTAL	**69 enterprises**	

[1] The percentage contribution of each sector to the sub-total is indicated in parentheses

A cluster procedure was also used in order to verify the results obtained from an analysis of the scatterplot. Two clusters were requested because the aim of the study is to distinguish between two groups of enterprises on the basis of their capital intensity and non-capital intensity. This procedure starts with the total group as a single cluster and disaggregates the sample into several clusters (groups) based on minimising multivariate variance within the total sample or maximising the distance between the cluster means (Punji and Steward, 1983). The outcome of the cluster analysis when compared to the results of the scatterplot provides a similar classification of enterprises if two groups are requested.

5.4.6 Relevance and applicability of the CI and LI classification results

The literature indicates the use of several individual measures to evaluate capital intensity, while an economic perspective of capital intensity offers parallels with the more traditional

measures. However, no reference was found to a measure which adequately addresses labour intensity. Labour intensity is generally referred to by an interpretation of a measure depicting capital intensity. The two measures proposed in this study aim to measure both the capital and labour intensity, although the literature confirms the use of both NFA:TA and NFA:EMP as different measures which both measure the same phenomenon. The relevance and suitability of the proposed approach is based on the need to distinguish between capital and labour intensity. One measure is unsuitable to use in this context and therefore two different and independent measures, which could be combined into a single measure, are suggested. One should also be cognisant of the fact that enterprises are not necessarily either capital intensive or labour intensive. Many of the enterprises provisionally included in this study were excluded on the basis of the fact that it was not possible to distinguish whether or not the enterprise is more capital intensive than labour intensive or visa versa.

Companies listed on the JSE are often used as a database to select enterprises for research in the financial, marketing or human resources domain. Several options are generally considered, depending on the nature and scope of the research. For instance, the top 100 listed companies are selected on the basis of a specific criterion, industrial sector enterprises are included subject to certain conditions, an aggregation of enterprises in several sectors is used, or a disaggregation of enterprises across several sectors. Often the objective of the research dictates the sector or sectors considered for inclusion in the research.

Although the initial basis of this research also draws from the enterprises listed in the industrial sector of the JSE in 1992, an attempt is made to complement the current classification of enterprises by also considering an enterprise as either CI or LI. Adding this dimension to the selection of an enterprise further enhances decision-making with regard to which listed enterprises to use in research and analysis. Researchers are encouraged to take a more elaborate view of the effect external factors have on enterprises which are CI and those that are more LI. In this manner economic factors such as price of labour production and other economic costs can be factored into the research to determine whether or not to include an enterprise as part of an analysis.

An upswing and decline in the economic cycle has a general effect on the financial performance of all enterprises. However, as indicated, it is possible to assign an enterprise the

label of CI or LI. It may be anticipated that the mix of capital and labour in an enterprise, be it more CI or more LI, may be affected differently during an upswing or decline in the economic cycle. Given the capital-labour mix and the recognition that financial performance of enterprises that are more CI would be affected differently to enterprises that are more LI, the need exists to analyse the CI and LI groups of enterprises during both phases of an economic cycle.

5.5 Summary

A brief overview of the research design is provided in the first part of this chapter. An analysis of the economic cycle is conducted in order to determine a period for the research. Economic activity in this study as measured by the Gross Domestic Product (at constant 1995 prices) is used as an indicator of movements in the business cycle over the period 1987 to 1992. The annual GDP figures as quoted by the South African Reserve Bank are used to analyse the upswing and decline phase of the economic cycle. A neutral year occurred in the South African economy during 1986 in which no increase or decrease in economic growth was achieved. The review period is therefore composed of three positive growth years (1987-1989) and three negative growth years (1990-1992) which follow directly on the basis year. The limitation of non-corresponding months between the changeover of the economic cycle from an upswing to a decline or vice versa and the financial year-end of the enterprise is also noted. The analysis of the economic cycle forms part of the second part of the chapter.

The third part of this chapter focuses on the distinction between enterprises listed in the industrial division of the JSE on the basis of the level of capital and labour intensity. The aim of the classification is to determine unrelated groups of enterprises which are used in the statistical analysis conducted in Chapters 7 and 8. Enterprises listed in all the sub-sectors of the industrial sector, with the exception of industrial holding enterprises, are considered for inclusion in the study.

In order to distinguish between CI and LI enterprises, two financial measures NFA:TA and NFA:EMP are considered. Descriptive data analysis is used to analyse the distribution of the NFA:TA and NFA:EMP variables. Normal probability plots supported by descriptive statistics revealed the need for a logarithmic transformation of the NFA:EMP, while both

ratios are ultimately standardised to enable relevant comparisons. A scatterplot of the standardised NFA:TA and standardised (log NFA:EMP) is used to effectively assign each enterprise to one of four quadrants on a two-dimensional scatterplot.

Both the standardised NFA:TA and standardised (log NFA:EMP) classification measures are initially considered on a one-dimensional basis. The use of the standardised NFA:TA for classification purposes indicates the inclusion of 37 enterprises, of which 20 could be considered as high CI and 17 low CI. The use of the standardised (log NFA:EMP) measure indicates the inclusion of 32 enterprises, of which 13 are high LI and 19 are low LI.

A correlation between the two individual classification measures indicates a coefficient of 0,72. However, a correlation of 0,72 implies that 48,16% of the variation in one of the variables is not accounted for by the other, through a linear regression relationship. A coefficient of one would indicate a perfect relationship, which implies that each measure could be used individually to distinguish between the groups of enterprises on the basis of capital or labour intensity. Hence it can be argued that a single measure which considers the capital-intensive nature of an enterprise relative to its labour intensity should be based on both these variables.

The scale constructed from the Euclidean Distance associated with two ratios, which measures different aspects of the production process, differentiates between CI and LI enterprises. The scale values for enterprises included in the analysis range from –2,8957 to +3,7562. On the basis of this scale a positive value indicates a CI enterprise and a negative value a LI enterprise. An enterprise is considered more CI the larger (or more positive) this scale value becomes and more LI when the scale value becomes smaller (or more negative). This scale can now easily be transformed into a percentile scale. Scale values in the neighbourhood of zero indicate enterprises which are not predominantly LI or CI. Users wanting to distinguish between a group of predominantly LI enterprises and a group of predominately CI enterprises may do so by considering the x% enterprises having the largest scale values and the x% enterprises with the smallest scale values.

By using the base-line criteria mentioned above, an enterprise which has a Euclidean Distance of larger than 0,95 is classified as either CI or LI. In the final analysis 33 of the 69 enterprises

could be considered as CI and 36 as LI. A cluster procedure is also used in order to verify the results obtained from an analysis of the enterprises on the basis of both classification measures. The outcome of the cluster analysis when compared to the results of the combined use of the standardised NFA:TA and standardised (log NFA:EMP) classification measures provides a similar classification for CI and LI enterprises if two groups are requested.

The contribution of each JSE-classified sector (prior to the reclassification of enterprises) to the inclusive number of 69 CI and LI enterprises indicates that Building, Construction and Allied contributes 24,2% of the enterprises, followed by Chemicals, Oils and Plastics with 15,1%. Clothing and Textiles and Beverages, Hotels and Leisure contribute 12,1% of the enterprises to the CI group. Conversely, the Clothing and Textiles sector contributes 30,5% of the enterprises and the Wholesale and Retail sector 25,0%, while the Furniture and Household sector contributes 11,1% of the enterprises to the LI group of enterprises.

The classification of enterprises as CI or LI and the identification of the research period based on the economic cycle are two essential ingredients for the statistical analysis conducted in Chapters 7 and 8. These chapters present the findings of analysis related to the behaviour of the selected ratios for the CI and LI enterprises during the upswing and decline phases of the economic cycle based on a single representative measure and the individual years of the study period.

The following chapter considers the selection and calculation of the financial performance indicators for the CI and LI enterprises for the individual years of the upswing and decline phases.

Appendix 5A: Figures for the standardised (NFA:TA), standardised (log NFA:EMP) and scale values based on the Euclidean Distance measure for provisionally selected enterprises

Company	Std (NFA:TA)	Company	Std (log NFA:EMP)	Company	Scale value
Profurn	–1,5132	Profurn	–2,4689	Profurn	–2,8957
Berzak	–1,4800	Ensign	–2,1784	Ensign	–2,4709
Vektra	–1,3555	Pep	–1,9337	Concor	–2,1155
Siltek	–1,3535	Concor	–1,8033	Pep	–2,1081
Midas	–1,3296	Pointer	–1,8002	JDGroup	–2,0183
Mashold	–1,3140	Seardel	–1,6703	Pointer	–1,9970
Fintech	–1,3114	JDGroup	–1,6447	Seardel	–1,9520
Grintek	–1,2829	Delswa	–1,5467	Q-Data	–1,8328
Boumat	–1,2674	Q-Data	–1,5168	Vektra	–1,8157
Foschini	–1,2368	Adonis	–1,4444	Rextrue	–1,6864
JDGroup	–1,1699	Ninian	–1,3819	Af-&-Over	–1,6678
Amrel	–1,1673	Rextrue	–1,3414	Delswa	–1,6568
Ensign	–1,1662	McCarthy	–1,3293	Berzak	–1,6020
ED-L-Bate	–1,1642	Af-&-Over	–1,3188	Boumat	–1,5954
Hicor	–1,1274	Vektra	–1,2081	Adonis	–1,5789
Concor	–1,1061	Texmill	–1,1211	Mashold	–1,5770
Otis	–1,0952	Hicor	–1,0382	Ninian	–1,5742
T-M-L	–1,0719	Amrel	–0,9940	Fintech	–1,5673
Q-Data	–1,0288	Boumat	–0,9691	Amrel	–1,5332
Rex-True	–1,0221	HLH	–0,9479	Hicor	–1,5325
Af-&-Over	–1,0210	Speclty	–0,9439	McCarthy	–1,5323
Speclty	–1,0184	Ellerine	–0,9379	Siltek	–1,4988
Trencor	–1,0133	Presmed	–0,9350	Midas	–1,4702
Seardel	–1,0102	Namfish	–0,9222	Grintek	–1,4624
Gentech	–1,0029	Allwear	–0,8813	Foschini	–1,4187
Metcash	–0,9987	Mashold	–0,8720	Speclty	–1,3886
Boymans	–0,9764	Clicks	–0,8683	Ellerine	–1,3287
Grinaker	–0,9484	Shoprit	–0,8637	Otis	–1,3141
Ellerine	–0,9412	Fintech	–0,8582	Boymans	–1,2434
Bearman	–0,8919	T-E-J	–0,8069	Macadam	–1,1913
Macadam	–0,8888	Macadam	–0,7933	Gentech	–1,1822
Edgars	–0,8758	Boymans	–0,7698	Grinaker	–1,1772
Altech	–0,8707	Winbel	–0,7325	Ed-L-Bate	–1,1760
Pointer	–0,8644	Otis	–0,7262	Metcash	–1,1595
Pep	–0,8395	Grintek	–0,7020	Clicks	–1,1486
Usko	–0,8203	Grinaker	–0,6974	HLH	–1,1419
McCarthy	–0,7623	Foschini	–0,6951	Texmill	–1,1217
Ninian	–0,7540	Cemenco	–0,6883	T-M-L	–1,1046
Clicks	–0,7519	Siltek	–0,6438	Presmed	–1,0195
Inmins	–0,7358	Afcol	–0,6281	Trencor	–1,0146
Port	–0,7343	Midas	–0,6273	Edgars	–1,0052
Hudaco	–0,7260	Gentech	–0,6259	Shoprit	–0,9892
Afcol	–0,7125	Berzak	–0,6132	Allwear	–0,9796
Ventron	–0,6772	Port	–0,6042	Port	–0,9509
Altron	–0,6767	Inmins	–0,5939	Afcol	–0,9498
Gubings	–0,6430	Metcash	–0,5891	Inmins	–0,9456
Control	–0,6399	Harwill	–0,5595	Altech	–0,8707
Adonis	–0,6378	Edgars	–0,4932	Hudaco	–0,8553
HLH	–0,6368	Progress	–0,4852	Winbel	–0,8031
Delswa	–0,5937	Picknpay	–0,4755	Waltons	–0,7418
Waltons	–0,5782	Waltons	–0,4647	Harwill	–0,7303
Cashbil	–0,5351	Hudaco	–0,4523	Ventron	–0,6867

Shoprit	–0,4822	Laser	–0,4159	Altron	–0,6862
CNAGalo	–0,4703	Chubb	–0,4001	Control	–0,6699
Harwill	–0,4693	CNAGalo	–0,3759	CNAGallo	–0,6021
Allwear	–0,4278	Perskor	–0,3371	Cashbil	–0,5683
Consol	–0,4205	I-C-S	–0,2698	Reunert	–0,4617
Presmed	–0,4065	T-M-L	–0,2669	Gen–Optic	–0,4256
Gen-Optic	–0,3977	Reunert	–0,2530	Consol	–0,4224
Reunert	–0,3863	Prem–Grp	–0,2430	Chubb	–0,4088
Chemserve	–0,3573	L-T-A	–0,2056	Perskor	–0,4088
Winbel	–0,3292	Control	–0,1984	Prem–Grp	–0,2899
Delta	–0,2764	Cashbil	–0,1912	Delta	–0,2779
Perskor	–0,2312	Lonsugr	–0,1908	L-T-A	–0,2496
Siloak	–0,2084	Da-Gama	–0,1758	Group-5	–0,2049
Powtech	–0,1830	Group-5	–0,1723	Powtech	–0,1907
Prem-Grp	–0,1581	Gen-Optic	–0,1515	Af-Cable	0,0000
Coates	–0,1576	Altron	–0,1138	Bearman	0,0000
Ocfish	–0,1519	Ventron	–0,1138	Cemenco	0,0000
L-T-A	–0,1415	Powtech	–0,0535	Chemserve	0,0000
I-&-J	–0,1156	Trencor	–0,0527	Coates	0,0000
Group-5	–0,1109	Foodcrp	–0,0519	Da-Gama	0,0000
SA-Drug	–0,1037	Consol	–0,0397	Foodcorp	0,0000
AF-Cable	–0,0912	Yorkcor	–0,0397	Gubings	0,0000
Chubb	–0,0840	Delta	–0,0291	I-&-J	0,0000
Math-Ash	–0,0222	Altech	–0,0091	ICS	0,0000
Nei-Afr	–0,0114	Putco	0,0173	Math-Ash	0,0000
Gentyre-A	0,0281	Usko	0,0184	Namfish	0,0000
Tex-Mills	0,0364	Math-Ash	0,0212	Nei–Afr	0,0000
Standrd	0,0488	Fralex	0,0854	Ocfish	0,0000
Itltile	0,0498	Siloak	0,1086	Picknpay	0,0000
Da-Gama	0,0576	Alexndr	0,1125	SA-Drug	0,0000
T-E-J	0,0913	Ed-L-Bate	0,1667	Siloak	0,0000
Foodcrp	0,1033	Nei-Afr	0,1697	T-E-J	0,0000
TPN	0,1162	I-&-J	0,1793	Tigr-Oats	0,0000
I-C-S	0,1743	Fenix	0,2080	Usko	0,0000
Adcock	0,1904	Bearman	0,2304	Gentyre-A	0,4391
Haggie	0,1950	Masonite	0,2576	Haggie	0,4767
Tigr-Oats	0,1961	Crookes	0,3502	Standrd	0,5324
Omnia	0,2096	Plastal	0,3502	Caxton	0,5484
Caxton	0,2210	Medclin	0,3715	Plastal	0,5533
Namfish	0,2391	Chemserve	0,4006	CTP	0,5755
Cemenco	0,2428	Haggie	0,4350	Hortors	0,6159
CTP	0,2448	Gentyre-A	0,4382	Holdain	0,6516
Picknpay	0,3418	Hortors	0,4846	Cadswep	0,7029
CAFCA	0,3506	Caxton	0,5019	CGS-Food	0,7258
Voltex	0,3688	Cadswep	0,5152	TPN	0,8107
Holdain	0,3776	CTP	0,5209	Metkor	0,8124
Hortors	0,3802	Standrd	0,5302	Unihold	0,8396
Metkor	0,4046	Holdain	0,5310	Adcock	0,9018
Plastal	0,4284	Gubings	0,5474	Dorbyl	0,9129
CGS-Food	0,4626	Tigr-Oats	0,5566	Fralex	0,9286
Cadswep	0,4782	CGS-Food	0,5592	Alexndr	0,9356
Dorbyl	0,4896	SA-Drug	0,5703	Metair	0,9461
Publico	0,5010	Metair	0,5774	SA-Brews	0,9461
Unihold	0,5098	Wooltru	0,5961	Wooltru	0,9661
Toyota	0,5638	Af-Cable	0,6136	Everite	1,0236
Sentrchem	0,5689	Coates	0,6544	Voltex	1,0648
Engen	0,5695	Unihold	0,6671	Masonite	1,1111
AECI	0,5912	SA-Brews	0,6861	Publico	1,1211
SA-Brews	0,6514	Ocfish	0,7024	Nampak	1,1240

Everite	0,6825	Metkor	0,7045	Progress	1,1691
Nampak	0,7126	Everite	0,7628	Romatex	1,1848
Suncrush	0,7447	Dorbyl	0,7705	Confram	1,2918
Metair	0,7494	Tongaat	0,7755	Suncrush	1,3180
Wooltru	0,7603	TPN	0,8023	Toyota	1,3270
Romatex	0,8547	Romatex	0,8205	Omnia	1,3414
Confram	0,9247	Nampak	0,8693	AECI	1,3966
Fralex	0,9247	Adcock	0,8815	Itltile	1,4043
Alexndr	0,9288	Confram	0,9021	Lonsugr	1,4651
Hiveld	0,9989	Voltex	0,9989	Yorkcor	1,5117
Progress	1,0637	Publico	1,0029	Medclin	1,5119
Masonite	1,0808	Karos	1,0692	Sentrchem	1,5185
CMI	1,0953	Suncrush	1,0874	Fenix	1,5393
Gypsum	1,3956	Toyota	1,2013	Putco	1,5486
Lonsugr	1,4526	Gypsum	1,2284	CAFCA	1,5561
Medclin	1,4656	AECI	1,2652	Tongaat	1,6595
Tongaat	1,4671	Omnia	1,3249	Laser	1,6636
PPC	1,5081	Itltile	1,4034	Gypsum	1,8592
Yorkcor	1,5112	Sentrchem	1,4078	Hiveld	1,9446
Fenix	1,5252	Afrox	1,4710	Afrox	2,3500
Putco	1,5486	Kersaf	1,4756	PPC	2,3813
Laser	1,6108	CAFCA	1,5161	Kersaf	2,4811
Sappi	1,7072	Porthld	1,6679	CMI	2,4971
Afrox	1,8327	Hiveld	1,6685	Sappi	2,7368
Sasol	1,9333	Sun-Bop	1,7627	Porthld	2,8964
Kersaf	1,9945	PPC	1,8429	Crookes	2,9118
Ang-Alpha	2,0905	Sappi	2,1390	Engen	3,0210
Porthld	2,3679	CMI	2,2441	Sasol	3,0252
Crookes	2,8907	Sasol	2,3268	Karos	3,1025
Karos	2,9124	Ang-Alpha	2,4623	Ang-Alpha	3,2300
Sun-Bop	3,3169	Engen	2,9669	Sun-Bop	3,7562

Note: Enterprises that are highlighted are excluded due to insufficient information.

Appendix 5B: A list of the CI and LI enterprises together with their scale values and JSE sector classification

CAPITAL INTENSIVE ENTERPRISES	Scale values	JSE–CLASSIFIED SECTOR	LABOUR INTENSIVE ENTERPRISES	Scale values	JSE-CLASSIFIED SECTOR
AECI	1,396	Chem., Oils and Plastics	Adonis Knitwear Holdings	–1,578	Clothing and Textiles
African Oxygen	2,350	Engineering	African and Overseas Enterprises	–1,667	Clothing and Textiles
Anglo Alpha	3,230	Build., Construct. and Allied	Allwear	–0,980	Clothing and Textiles
Consolidated Frame Tex.	1,291	Clothing and Textiles	Amalgamated Retail	–1,533	Clothing and Textiles
Consolidated Metal. Ind.	2,497	Steel and Allied	Associated Furniture Co.	–0,950	Furniture and Household
Crookes Brothers	2,911	Food	Boumat	–1,595	Build., Construct. and Allied
Engen	3,021	Chem., Oils and Plastics	Boymans	–1,243	Wholesale and Retail
Everite	1,023	Build., Construct. and Allied	Brian Porter Holdings	–0,951	Motor
Fenix Industries	1,539	Clothing and Textiles	Concor	–2,115	Build., Construct. and Allied
Gypsum Industries	1,859	Build., Construct. and Allied	Delswa	–1,656	Clothing and Textiles
Highveld Steel and Vanad.	1,944	Steel and Allied	Edgars Stores	–1,005	Wholesale and Retail
Karos Hotels	3,102	Bever., Hotels, and Leisure	Edward L. Bateman	–1,176	Engineering
Kersaf Investments	2,481	Bever., Hotels, and Leisure	Ellerine Holdings	–1,328	Furniture and Household
Laser Transport Holdings	1,663	Transport	Ensign Clothing	–2,471	Clothing and Textiles
Lonrho Sugar Corporation	1,465	Food	Fintech	–1,567	Electronics and Electrical
Masonite (Africa)	1,111	Build., Construct. and Allied	Foschini	–1,418	Wholesale and Retail
Nampak	1,124	Paper and Packaging	General Technologies	–1,182	Electronics and Electrical
Omnia Holdings	1,341	Chem., Oils and Plastics	Grinaker	–1,177	Build., Construct. and Allied
Portland Holdings	2,896	Build., Construct. and Allied	Hunt Leuchars and Hepburn	–1,141	Food
Pretoria Portland Cement	2,381	Build., Construct. and Allied	JD Group	–2,018	Furniture and Household
Progress Industries	1,169	Clothing and Textiles	Mas Holdings	–1,577	Wholesale and Retail
Putco	1,548	Transport	McCarthy Group	–1,532	Wholesale and Retail
Romatex	1,184	Clothing and Textiles	Metro Cash and Carry	–1,159	Wholesale and Retail
Sappi	2,736	Build., Construct. and Allied	Ninian and Lester Holdings	–1,574	Clothing and Textiles
Sasol	3,025	Chem., Oils and Plastics	Otis Elevator Co	–1,314	Build., Construct. and Allied
Sentrachem	1,518	Chem., Oils and Plastics	Pep	–2,108	Wholesale and Retail
Sun International (Bop.)	3,756	Bever., Hotels, and Leisure	Pointer Fashion International	–1,997	Clothing and Textiles
Suncrush	1,318	Bever., Hotels, and Leisure	Protea Furnishers	–2,895	Furniture and Household
Tongaat-Hullet Group	1,659	Food	Rex Trueform Clothing Co	–1,686	Clothing and Textiles
Toyota S.A.	1,327	Motor	Seardel Investment Corporation	–1,952	Clothing and Textiles
Voltex Holdings	1,064	Electronics and Electrical	Shoprite	–0,989	Wholesale and Retail
Wooltru	0,966	Wholesale and Retail	Siltek	–1,498	Electronics and Electrical
York Timber Organisation	1,511	Build., Construct. and Allied	Textile Mills (1947) Holdings	–1,121	Clothing and Textiles
			The Clicks Group	–1,148	Wholesale and Retail
			Times Media	–1,104	Printing and Publishing
			Trencor	–1,014	Transport

CHAPTER 6

SELECTION AND CALCULATION OF FINANCIAL PERFORMANCE INDICATORS RELEVANT TO THE STUDY

6.1 Introduction

Financial performance indicators are generally used to analyse the performance of an enterprise's operations over a specified period. Generally the same indicators are used to measure performance during periods of positive and negative economic growth. The relevance and appropriateness of using the same indicators to measure performance during different phases of the economic cycle becomes the premise on which the analyses of various ratios are based. The indicators used in the research are identified and selected from the analyses in Chapters 2, 3 and 4. The ratios highlighted in this chapter are calculated for the upswing and decline phase for each enterprise in the CI and LI group as identified in Chapter 5.

The scope of this chapter entails the selection of relevant and appropriate financial performance indicators, sourcing the financial statements from BFA-NET for the CI and LI enterprises identified previously and applying user-defined indicators to the financial statements of the selected enterprises. Part one of this chapter considers the selection of various financial performance indicators, which range from traditional to inflation-adjusted indicators and are indicative of ratios generally used to analyse the performance of JSE industrial enterprises. Part two entails obtaining the financial statement data of the enterprises required for the analysis from a standardised database of financial statements (BFA-NET) and readapting them to the specifications of the research. Part three addresses the application of user-defined financial indicators to a set of user-defined balance sheets, income statement and cash flow statements. Only an inflation-adjusted balance sheet and income statement are applicable to the inflation-adjusted group of ratios. The financial statements are prepared for the CI and LI enterprises which cover the period 1987 to 1992.

6.2 Methodology

A systematic procedure is adopted to calculate the financial performance indicators required for the primary analysis. The traditional profitability, growth, cash flow, value and inflation-adjusted ratios discussed and analysed in previous chapters are identified. Once the ratios are identified, the financial statement data required for the application of the financial ratios are sourced for the two groups of CI and LI enterprises from the Bureau for Financial Analysis, University of Pretoria database (BFA-NET Version 8.0, 1997). Several intermediate procedures are required to obtain clarity on the standardisation method, the best manner possible to adapt the standardised financial statements for user-defined requirements and the identification of a master enterprise for test and control purposes. The first step requires an understanding of the method used by BFA-NET to standardise the financial statements. Secondly, a user-defined set of financial statements, which includes a balance sheet, income statement, cash flow statement, an inflation-adjusted income statement and balance sheet as well as sundry items provided by BFA-NET and certain user-defined sundry items are compiled using the line items specified for each company in the BFA-NET database.

A JSE-listed company SAFREN is used as the control (test) enterprise for the manual and electronic calculations of the ratios. The financial statements for SAFREN 1995 are used to reconcile the BFA-NET standardised financial statements with the published information of the company as indicated in its annual financial report. Once this step is complete, the line items specified in the BFA-NET standardised financial statements for SAFREN 1995 are used to determine the validity of the user-defined financial statements. Various adjustments to the BFA-NET standardised balance sheet, income statement and cash flow statement are also required before the user-defined statements can be compiled.

The user-defined balance sheet, cash flow statement and the inflation-adjusted balance sheet are compiled for SAFREN 1995 by using the BFA-NET specified line items and the adjustments to several items in the standardised statements. The specified ratios are calculated for SAFREN 1995 by using the user-defined financial statements. SAFREN 1995 also serves as the master company for the application of the ratios to each CI and LI enterprise. However, several specific adjustments are required for each enterprise when the inflation-adjusted ratios are calculated.

6.3 Financial performance indicators included in the analysis

An in-depth analysis of indicators for measuring financial performance is provided in Chapters 2, 3 and 4. Groups of performance indicators which form the discussion in each of the preceding chapters is selected to represent an appropriate cross-section of indicators for the measurement of financial performance. These categories of indicators represent traditional profitability and growth indicators discussed in Chapter 2, cash flow indicators analysed in Chapter 3 and value performance indicators considered in Chapter 4. In addition, several inflation-adjusted and growth indicators discussed in Chapter 2 are also considered. The indicators included in the analysis are representative of a wide spectrum of financial performance ratios and provide a valid and credible selection of indicators. Furthermore, these indicators are also considered an adequate reflection of the characteristics of most South African industrial enterprises. Table 6.1 indicates the ratio per category of financial performance indicators included in the analysis.

Table 6.1 Financial performance indicators included in the analysis

Traditional profitability performance indicators	
X1	Return on total net assets before tax (RONA)
X1A	Return on total net assets after tax ($RONA_{1-t}$)
X2	Return on total shareholders' interest before tax (ROE)
X2A	Return on total shareholders' interest after tax (ROE_{1-t})
X3	Return on ordinary shareholders' interest before tax (ROSE)
X3A	Return on ordinary shareholders' interest after tax ($ROSE_{1-t}$)
X4	Return on net operating assets before tax (RNOA)
X4A	Return on net operating assets after tax ($RNOA_{1-t}$)
X5	Return on sales before tax (ROS)
X5A	Return on sales after tax (ROS_{1-t})
X6	Net income margin before tax (NIM)
X7	Earnings per share (EPS)
X8	Dividend per share (DPS)
X9	Turnover to total net assets (TURN:TNA)
X10	Interest-bearing debt to total shareholders' interest (IBD:TSI)

Table 6.1 (continued)

Traditional growth performance indicators
X11 Growth in net turnover (GTURN)
X12 Growth in dividend per share (GDPS)
X13 Growth in earnings per share (GEPS)
X14 Growth in attributable earnings (GATR.EARN)
X15 Growth in total net assets (GTNA)
X16 Growth in total shareholders' interest (GTSI)
X17 Internal growth rate after tax (IGR_{1-t})
X18 Sustainable growth rate after tax (SGR_{1-t})
X19 Growth in cash from operating activities (GCOA)
Cash flow performance indicators*
X20 Cash flow (CTA) to total net assets (CTA:TNA)
X21 Cash flow (COA) to total net operating assets (COA:TNOA)
X22 Cash flow (CATA) to total shareholders' interest (CATA:TSI)
X23 Cash flow (CATA less preference dividend) to ordinary dividend payments (CATA:DIV)
X24 Cash flow (CTA) to interest payments (CTA:INT)
X25 Cash flow (CATA) to total debt (CATA:TD)
X26 Cash flow (CATA) to current liabilities (CATA:CL)
X27 Cash flow (CATA less preference dividend) to capital redemption (CATA:CAP.RED)
X28 Cash flow (CATA) to [long-term loans repaid + fixed asset purchases + total dividend paid] (CATA: (L/T Loans + FA + TOT.DIV)
X29 Cash flow (NCTA) to [gross non-current assets and net current assets] (Reinvestment)
X30 Cash flow (NCTA) to capital investments (NCTA: CAP.INV)
X31 Cash flow (NCTA) to financial investments (NCTA:FIN.INV)
X32 Cash flow (NCTA) to [capital investments + financial investments + capital redemption] (NCTA: (CAP.INV + FIN.INV + CAP.RED)
X33 Cash flow (CATA) to turnover (CATA:TURN)
X34 Cash flow (CATA less preference dividend) per ordinary share (CATA/SHARE)
X35 Price per share to cash flow (CATA less preference dividends) per share (P/SHARE: CATA/SHARE)
X36 Working capital to operating cash flow (earnings before interest and tax + depreciation) (WC:OCF)
X37 Cash flow (CATA) to net income after tax (earnings) (CATA:NIAT)
X38 Cash flow (CTA) less interest paid to net income before tax (CTA:NIBT)
Value-related performance indicators
X39 Economic value added (EVA)
X40 Market value added (MVA)
X41 Tobin's Q-ratio (Q-RATIO)
X42 Profitability index: capital spread (RONA:WACC)
X43 Profitability index: equity spread (ROE:K_e)
X44 Value index: market value of equity : book value of equity (MVE:BVE)
X45 Value index: market value of equity : book value of equity per share (MVE:BVE/SHARE)
X46 Value index: ROE : earnings yield (ROE:EY)
X47 Warranted equity value (WEV) : book value of equity (BVE) (WEV:BVE)

Table 6.1 (continued)

Inflation-adjusted performance indicators**	
X48	Return on total net assets before tax ($RONA_{real5}$)
X48b	Return on total net assets before tax ($RONA_{real10}$)
X49	Return on total shareholders' interest before tax (ROE_{real5})
X49b	Return on total shareholders' interest before tax (ROE_{real10})
X50	Return on ordinary shareholders' interest before tax ($ROSE_{real5}$)
X50b	Return on ordinary shareholders' interest before tax ($ROSE_{real10}$)
X51	Earnings per share (EPS_{real})
X52	Return on sales (ROS_{real})
X53	Dividend coverage ratio ($DIV.COV_{real}$)
X54	Net income margin (NIM_{real})

Notes:

* Abbreviations used to define elements in the cash flow statement
- COA Cash from operating activities
- CTA Cash from total activities before interest and taxation
- CATA Cash available from total activities after interest and taxation
- NCTA Net cash from total activities

** Many problems are encountered with the disclosure of information with regard to land and buildings in the financial statements of enterprises. Certain inflation-adjusted ratios, which include land and buildings, are calculated on the basis that land and buildings are revalued on the premise of a five-year and ten-year average age period respectively. The indicators which use a ten-year average age for land and buildings are indicated by a "b" in the table above.

6.4 Source and structure of financial statement information

The financial data required to calculate the indicators are sourced from the Bureau for Financial Analysis, University of Pretoria database (BFA-NET Version 8.0, 1997). Information contained in the database includes financial statements in a standardised form for all enterprises currently listed on the JSE. The BFA-NET database provides a series of programmed BFA financial performance indicators, while also offering a facility to programme user-defined financial ratios. Furthermore, the database also enables the user to create portfolios of enterprises which could be used as a mechanism to generate financial ratios for a specific group of enterprises such as CI and LI enterprises. The database consists of a standardised balance sheet comprising 42 line items, an income statement comprising 51 line items, a cash flow statement comprising 26 line items and a 66 line items of sundry information (BFA-NET Version 8.0, 1997).

However, before the ratios are calculated from the information in the database, it is necessary to consider the procedures used by BFA-NET to standardise the published financial statement

information of the enterprises included in the database. Several of the procedures used to standardise the published financial information of enterprises included in the BFA-NET database encompass the following:

- Equity profits of associate companies are not included, only related dividends are included;
- Provision for deferred tax are written back;
- Provision for additional depreciation is also written back;
- Exceptional items are included in the calculation of attributable profit;
- General provisions which do not represent an immediate liability are written back;
- Cost of control and all intangible assets are subtracted from ordinary shareholders' interest.

Appendix 6A provides a set of standardised BFA financial statements for SAFREN 1995, which are reconciled with the published financial statements of the company in order to verify the method and approach used by the Bureau for Financial Analysis to standardise a company's financial statements.

Once an adequate understanding is achieved of the standardisation procedures used by BFA-NET, the statements are adapted to the specific requirements of the research and the calculation of the financial performance indicators. The BFA-NET balance sheet, income statement and cash flow statement are adapted to adhere to user-defined needs. The adapted financial statements are indicated in Appendix 6B. Several of the adjustments to the BFA-NET financial statements included in the user-defined financial statements are indicated in the following sections.

6.4.1 Adjustments to standardised BFA-NET balance sheet

Distributable reserves (line item 3 in the balance sheet): - Total deferred taxation is included as part of distributable reserves by BFA-NET. For the purposes of the user-defined calculations, deferred tax is deducted from the distributable reserves, which implies that ordinary shareholders' interest and total shareholders' interest is reduced by the applicable amount. However, total deferred tax is included as part of total capital. Distributable

reserves also include various other provisions and reserves. In order to ensure a standardised procedure across all the companies included in the database, BFA-NET also includes the following items if and when they occur in the financial statements as part of the distributable income: general reserve; unappropriated profit; tax equalisation provision for future township planning; pensions and gratuities; possible losses on investments; special maintenance; additional reserves and provisions for replacement of machinery and equipment; bad debts; any other provision and all other reserves which could be distributed as income.

BFA-NET includes these reserves and provisions in principle due to the belief that the applicable funds are still available to be used. The appropriate amount is subtracted from the applicable item in the financial statements and added to distributable reserves. These provisions should possibly not be included as part of distributable reserves, but for technical reasons it is not possible to deduct the appropriate amounts from the relevant items.

6.4.2 Adjustments to standardised BFA-NET income statement

Trading profit (line item 54 in the income statement): - The "trading profit" is not generally indicated in the financial statements, but is used as a balancing total in the BFA-NET income statement. This reconciliation is accomplished by adding auditors' remuneration, depreciation, leasing charges for moveable assets, directors' remuneration, remuneration for technical and other outside services and provisions to income before taxation, dividends and interest. The preceding items are only added if they have already been deducted from trading profit in order to arrive at an opening figure in the income statement.

Taxation (line item 76 in the income statement): - Normal company taxation, both local and foreign for the year, taxation on distributed income and secondary tax on companies are included in the taxation figure. Normal taxation on extraordinary items is added or subtracted and is also indicated as a separate item (line item 186). Deferred taxation for the year is not included, neither is taxation in respect of previous years (equalisation). The deferred taxation is, however, included as additional information under the sundry items (line item 129). The provision for taxation is therefore based on the cash amount the company expects to pay on the net income for the year. For the purposes of the user-defined calculations, the deferred taxation for the year is deducted from the retained income and added to the taxation for the

year, while the taxation in respect of previous years is left unchanged for technical reasons and is included as part of retained income in the income statement.

Retained income (line item 82 in the income statement): - The income retained by the company is adjusted to reflect the inclusion of several additional items which encompass transfers to and from reserves, excessive provisions, deferred taxation, prior adjustments for normal taxation, provisions for possible claims, goodwill and other intangible assets written off, and share of profit or losses of associated companies.

Provisions: If provisions have been taken into account to determine the "trading profit" (see section 6.4.1), and are of such a nature that they are not regarded as cost, the amount is added to the retained income as well as to "trading profit". Although this procedure is consistent with the rationale of BFA-NET to consider provisions as available funds, they cannot be deducted due to an item not forming part of the Sundry List as defined by BFA-NET, i.e. not specified separately.

Associates: The income received from associated companies is not shown as "trading profit". It is not regarded as distributable income of the group as the associated company is not controlled by the group and is therefore deducted from retained income, but disclosed separately in the sundry items (line item 138). However, dividends received from associate companies are indicated as part of dividends received.

Extraordinary items: All extraordinary items, which do not form part of the normal business of the company, are not included in the figure for extraordinary items in the income statement (see items included as distributable income, section 6.4.1). This would imply the deduction of profits from, and addition of losses to, retained income.

The standardised BFA-NET balance sheet and income statements are accepted in principle, however, where possible items that are not necessarily consistent with the manner used to compile the user-defined financial statements are either added back or subtracted. This is only possible if the particular item is indicated in the "sundry item" list (see Appendix 6A for a list of sundry items included by BFA-NET).

6.4.3 Adjustments to the standardised BFA-NET cash flow statement

Investment income (line item 704 in the cash flow statement): - This figure in the cash flow statement includes interest received, which for the user-defined purposes is added back together with other investment income. The BFA-NET approach in the cash flow statement is to set off the interest received against the interest paid, which implies that interest received is not included as part of investment income. In order to overcome this problem the total investment income in the income statement is used to reflect the total amount of investment income in the user-defined cash flow statement. The primary difference between the investment income in the adjusted cash flow statement and the BFA-NET income statement is an amount of 145, which refers to fees from unlisted investments, which may be regarded as a grey area, i.e. whether or not they should be included.

Financing charges (line item 712 in the cash flow statement): - BFA-NET considers financing charges as a net amount. The actual interest paid is used in the user-defined cash flow statement, which is also the interest paid (line item 74) used in the standardised BFA-NET income statement. The interest received is added back and included as part of investment income in the user-defined cash flow statement.

***Cash from operating activities*:** - Cash ex operations in the BFA-NET standardised cash flow statement is adjusted to reflect a figure after an increase or decrease in net current working capital.

***Cash from total activities before interest and tax*:** - This figure includes (cash from operating activities), total investment income and other income defined by BFA-NET.

***Increase in fixed assets*:** - Although it would be appropriate to separate the assets acquired for expansion and replacement, BFA-NET considers asset expansion and replacement as a total figure and technically it cannot be separated for user-defined calculations. This may be regarded as a limitation in the BFA-NET cash flow statement.

***Long- and short-term loans*:** - A further limitation refers to the use of net amounts for long- and short-term loans. Consequently, when financial coverage ratios are calculated, the "true"

value of cash outflows is not reflected. However, this limitation is accepted and the net figures indicated in the BFA-NET standardised cash flow statement are used for the purposes of user-defined calculations.

The BFA-NET standardised cash flow statement is accepted in principle for the purposes of the user-defined calculations. The only adjustments refer to investment income and the financing charges (see notes on investment income and financing charges) and the adjustments to certain cash flow statement items such as a decrease or increase in net current assets. These adjustments require a recalculation of the cash generated from operating activities (COA) and cash generated from total activities (CTA). The remainder of the BFA-NET standardised cash flow statement, succeeding CTA from cash available from total activities after interest and tax is accepted and the relevant figures are used for the user-defined cash flow statement.

6.4.4 Inflation-adjusted balance sheet and income statement

The BFA-NET database does not provide inflation-adjusted statements or financial performance indicators. In order to include inflation-adjusted performance indicators in the analysis, several BFA-NET and user defined line items are used to compile inflation-adjusted statements for the enterprises included in the analysis.

In order to ensure that the adapted statements are valid and acceptable, the actual values for SAFREN 1995 as used by BFA-NET together with the adjustments are used to compile a user-defined balance sheet, cash flow statement and inflation-adjusted balance sheet. The balance sheet, cash flow statement, and inflation-adjusted balance sheet are presented in Appendix 6C. The adapted SAFREN 1995 financial statements are used as the control (test) enterprise for the manual and electronic calculations of each financial performance indicator.

Once the user-defined statements are compiled and assessed for validity the user-defined financial performance indicators are applied to each enterprise's user-defined statements. Appendix 6D offers an in-depth analysis of the content of each performance indicator highlighted in Table 6.1 together with the method of calculation. All data items from the user-defined financial statements required to specify each performance indicator are

appropriately defined and, where required, detailed reference is provided to the procedures used to adapt a financial item.

6.5 Computational requirements and data output

In order to compile the processed data in an acceptable format for input into the computer software, nine data matrices (62 by 69) are compiled. A matrix of the enterprises and performance indicators are compiled for each year of the analysis from 1987 to 1992 and three additional matrices which represent the averages of the financial ratios for the three-year upswing and three-year decline periods. A value is calculated for each complete financial year of the research period and then added together to determine an average for the three-year upswing (1987-1989) and three-year decline (1990-1992) phases.

The standardised financial statements of each enterprise are downloaded from the BFA-NET database into an Excel spreadsheet format for ease of use. The formulae of each financial performance indicator were programmed for the SAFREN 1995 financial statements together with several other user-defined sundry items and applied to each of the enterprises included in the analysis. Microsoft™ Excel, a spreadsheet that forms part of the Microsoft™ Office family was used for this purpose. The additional sundry items are highlighted in Appendix 6C.

An overview of the nine data matrices indicated several limitations, which are inherent in the use of financial data for analytical purposes. Several of these limitations are discussed briefly and the procedure used to address the problem highlighted.

6.5.1 Missing data

Several instances may arise where data are missing in the matrix of financial results. This situation could be the result of undisclosed figures (e.g. turnover) or no dividend declaration in a particular year, which is omitted for the applicable financial period. In addition, where the denominator of a ratio equalled zero, the relevant year and or the ratio was also deleted, since these data points do not represent a true zero. The same procedure is used if an enterprise does not disclose its annual turnover.

6.5.2 Data errors

In addition to the problem of missing data, it is also possible that, for example, clerical or human error in capturing the data, negative numbers in both the numerator and the denominator of a particular ratio, or even non-comparability in the definition of certain ratios may arise. For instance, it is possible that a large write-off of goodwill or cost of control in subsidiaries could indicate negative total shareholders' interest. In turn this may lead to an inflated ROE figure if the income figure is also negative. However, none of the enterprises included in the analysis indicated a negative total shareholders' interest or a negative income for the individual years of the research period. The matrices compiled from the ratio data are checked against individual enterprise information in order to detect aspects within an enterprise context that may be the cause of extremely large or small values among the CI and LI groups. It appears from an analysis of several enterprises within the CI and LI groups for particular years of the analysis that business acquisitions, disposal of assets, extraordinary items, cash flow movements and working capital fluctuations are some of the possible causes for extremely large and small values apparent among certain ratios.

6.6 Summary

A systematic procedure is adopted to calculate the financial performance indicators used in the analysis. The traditional profitability, growth, cash flow, value and inflation-adjusted ratios discussed and analysed in previous chapters are selected to form part of the primary research. Once the ratios are identified, the financial statement data required for the calculation of the financial ratios are sourced from the Bureau for Financial Analysis, University of Pretoria database (BFA-NET Version 8.0, 1997) for the two groups of CI and LI enterprises. The database contains standardised financial statements of all JSE-listed companies. Several intermediate procedures are required to obtain clarity on the standardisation method, the best manner possible to adapt the standardised financial statements for user-defined requirements and the identification of a master enterprise for test and control purposes. A user-defined set of financial statements, which includes a balance sheet, income statement, cash flow statement, an inflation-adjusted income statement and balance sheet, and sundry items provided by BFA-NET as well as certain user-defined sundry items, is compiled using the line items specified for each company in the BFA-NET database.

SAFREN is used as the control (test) enterprise for the manual and electronic calculations of the ratios. The financial statements for SAFREN 1995 are used to reconcile the BFA-NET standardised financial statements with the published information of the company as indicated in its annual financial report. Once this step is complete, the line items specified in the BFA-NET standardised financial statements for SAFREN 1995 are used to determine the validity of the user-defined financial statements. Various adjustments to the BFA-NET standardised balance sheet, income statement and cash flow statement are also required before the user-defined statements could be compiled.

The user-defined balance sheet, cash flow statement and the inflation-adjusted balance sheet are compiled for SAFREN 1995. The specified ratios are calculated for SAFREN 1995 by using the user-defined financial statements. SAFREN 1995 also serves as the master company for the calculation of the ratios for all the CI and LI enterprises. In addition, several adjustments are required for each company when the inflation-adjusted ratios are calculated.

The financial statements of the 69 companies required for the research and listed in the BFA-NET database are downloaded in Excel format. The formulae for the ratios of the master company SAFREN are also programmed in Excel format, which facilitates the application of the master to all the other CI and LI enterprises included in the research. In order to compile the processed data in an acceptable format for input into the analytical software, nine data matrices (62 by 69) are compiled. A matrix of the enterprises and performance indicators are compiled for each year of the analysis from 1987 to 1992 together with three additional matrices which represent the averages of the financial ratios for the three-year upswing and decline periods. A single representative measure, which represents an average of the three-year cycles, is calculated for the three-year upswing (1987-1989) and the three-year decline (1990-1992) phases.

The CI and LI enterprise data are analysed in Chapters 7 and 8 as part of the second phase of the primary analysis. The data for the three-year upswing and three-year decline period are statistically analysed in Chapter 7 based on a single representative measure, while the raw data values for the individual years of the research period are statistically analysed in Chapter 8.

Appendix 6A: Reconciliation of the standardised BFA-NET and published financial statements of SAFREN for 1995

Item Description	1995	The references and figures in this column refer to the type of statement, applicable note and actual figures obtained from the published financial statements
SAFREN		**Abbreviations:**
Number of Months Covered	12	BS = Balance Sheet (p. 49)
Year-End Month	6	N18 = Note number 18 to the financial statements
		N/A = Not Applicable
BFA-NET round figures to nearest R'00		CFS = Cash Flow Statement (p. 50)
		IS = Income Statement (p. 48)
BALANCE SHEET (R'000s)		
1 Ordinary Share Capital	27 800	BS
2 Non-Distributable Reserves	1 145 200	BS (R662 400)+BS (R482 800)
3 Distributable Reserves	1 564 500	BS (R1033900)+BS (R365000)+N23 (R165589)
4 Less: Cost of Contr Subs		N/A
5 Intangible Assets		N/A
6 Ordinary Shareholders' Interest	2 737 500	Total (R27800+R1145200+R1564500)
7 Minority Interest	1 918 000	BS
8 Preference Share Capital	1 700	BS
9 Total Owners' Interest	4 657 200	Total (R2737500+R1918000+R1700)
10 Land And Buildings	2 152 100	N16 (R266787+R1885271)
11 Less: Total Depreciation	66 000	N16 (R9234+R56742)
12 Cost of Other Fixed Assets	4 769 900	N16 Total(R6921933–Line item 10)
13 Less: Total Depreciation	1 880 300	N16 Total (R1946231–Line item 11)
14 Total Fixed Assets *A	4 975 700	Total
15 Long-term Loans Advanced	147 600	N15 (R30726)+N19 (R18273)+ N20 (R145400)–N20 (R46773)
16 Unlisted Investments	166 400	N20 (R77670)+N20 (R11316)+ N19 (R30623)+N20 (R46773)
17 Shares in Uncon Subs		N/A
18 Listed Investments	385 300	N19 (R369656)+N19 (R15587)
19 Total Long-term Invest *B	699 300	Total
20 Total Long-term Assets *A+B	5 675 000	Total
21 Secured Long-term Borrowings	886 700	N15 (R886715)
22 Debentures		N/A
23 Other Long-term Borrowings	346 500	N15 (R470926)–N15 (R124420)
24 Total Lt Loan Cap *C	1 233 200	Total
25 Net Investment Lt Assets *A+B–C	4 441 800	Total
26 Total Stock	120 000	BS
27 Debtors	1 079 700	BS
28 Short–term Loans Adv *Z	494 800	BS (R16600)+N22 (R478208)
29 Cash and Bank	481 700	N22 (R481685)
30 Other Current Assets	11 500	N15 (R11555)
31 Total Current Assets *D	2 187 700	Total

Appendix 6A (continued)

32 Short-term Borrowings	227 700	BS (R227700)
33 Creditors	1 421 400	N23 (–R165589)+BS (R1587000)
34 Bank Overdraft	122 100	N22 (R122123)
35 Provision for Taxation	70 500	BS (R70500)
36 Provision for Dividends	130 600	BS (R130600)
37 Total Current Liabilities *E	1 972 300	Total
38 Net Current Assets *D–E	215 400	Total
39 Net Assets *A+B–C+D–E	4 657 200	Total
40 Total Assets *A+B+D	7 862 700	Total
41 Operating Assets *A+D–Z	6 668 600	Total
INCOME STATEMENT (R'000s)		
51 Turnover	5 814 700	IS
52 Change in Turnover %	15	
53 Cost of Sales		
54 Trading Profit *F	1 363 600	IS (R1333500)+N2 (R25200)+N4 (R4847)
55 Interest Received	110 300	N5 (R102024)+N2 (R8299)
56 Income Unlisted Investments	9 500	N2 (R7594)+N5 (R1872)
57 Income Listed Investments	11 600	N7 (R11592)
58 Income Uncon Subsids	2 500	N2 (R2458)
59 Total Income Investment *G	133 900	Total
60 Surplus Sale Investment		
61 Surplus Sale Non Tr Ass	29 000	N2 (R5098)–N8 (R5575)+N2 (R29533)
62 Extraordinary Profits	–1 600	N8 (–R12193+R22312–R11747)
63 Total Profits Extr Nat *H	27 400	Total
64 Auditors' Remuneration and Costs	10 800	N2 (R9674+R879+R178)
65 Depreciation Other Fixed Assets	341 800	N3 (R147076+R194750)
66 Depreciation Land and Buildings	7 000	N3 (R6580+R405)
67 Rental Other Fixed Assets	53 200	N2 (R53242)
68 Directors Rem - Dir	300	N4 (R286)
69 - Other	4 600	N4 (R4561)
70 Management and Other Services	9 500	N2 (R2384+R7060)
71 Total Cost Shown *J	427 200	Total
54 Trading Profit *F	1 363 600	See above
59 Plus: Tot Inc Inv. *G	133 900	See above
63 Tot Pr Extr. Nat *H	27 400	See above
72 Total Income *F+G+H	1 524 900	Total
71 Less: Total Cost Shown *J	427 200	Total
73 Profit Before Interest and Tax	1 097 700	Total
74 Less: Tot Interest Paid	155 900	N5(R175137–R19180)
75 Profit Before Taxation	941 800	Total
76 Less: Taxation	111 000	N6(R83641+R7899+R17385+R2110)
77 Profit After Taxation	830 800	Total
78 Less: Minority Interest in Profit	370 900	N8(–R4214+IS(R375200)–L81(R128)
79 Profit Ord. and Pref. Shares	459 900	Total

Appendix 6A (continued)

80 Less: Ordinary Dividend	172 100	IS
81 Preference Dividend	100	Included as part of minority interest
82 Retained Profit	287 700	N2(R4687)+N2(R51907)+N2(R25952)–N7(R12082)–N8(R3505)+N8(R6755)+ IS(R213900)
CASH FLOW (R'000s)		
701 Operating Profit/Loss	889 000	N30.1 (R1238099–R348811–R332)
702 Depr & Non-Cash items	349 100	N30.1 (R348811+R332)
703 Cash ex Operations	1 238 100	CFS or N30.1 (R1238099)
704 Plus: Investment Income	23 700	N30.2 (R31960–R8299)
705 Other Income		
706 Decr/incr Working Capital	–122 700	Total
707 Decr/incr in Stock	–8300	N30.3 (R8221)
708 Decr/incr Accounts Receivable	–266 900	N30.3 (R266857)
709 Inc/decr Accounts Payable	152 500	N30.3 (R152482)
710 Incr/decr Interest-free Loans		N/A
711 Cash ex Operating Activity	1 139 100	Total (R1238100+R23700–R122700)
712 Less: Net Interest paid/rec	45 600	N30.2 (–R8299)+N5(R53933)
713 Taxation paid	124 700	N30.4(R124716)
714 Cash Available	968 800	Total (R1139100–R45600–R124700)
715 Less: Ordinary Dividends	382 300	N30.5 (R382377)–S716(R128)
716 Preference Dividends	100	See Line item 81 of income statement
717 Net Retained Cash	586 400	Total (R968800–R382300–R100)
718 Less: Cash Invested	941 000	Total (R877700+R64700–R1400)
719 Fixed Assets Acquired	877 700	CFS (R565800+R311900)
720 Increase in Investments	64 700	CFS
721 Net Investment in Subs	–1 400	N30.6 and N30.7 (R4902+R1028+R3619–R10875)
722 Other Expenses/losses		N/A
723 Plus: Cash Ex Investment Activity	283 700	Total (R222500+R61200)
724 Proceeds Disposal Fixed Assets	222 500	CFS
725 Proceeds Disposal Investments	61 200	CFS
726 Other Proceeeds		N/A
727 Cash generated	–70 900	Total (R586400–R941000)+R283700
728 Incr/decr Long-term Liabilities	–223 800	N30.8 and N30.9 (–R221658–R2132)
729 Incr/decr Short-term Liabilities	293 000	CFS (R292700)+N30.3 (R271)
730 Change in Share Capital	1 700	N30.9 (R1738)
731 Other		
732 Cash Utilised	70 900	Total (–R223800+R293000+R1700)
SUNDRY DATA INFORMATION		
101 Number of Ordinary Shares Issued	555 300	
102 Number of Ordinary Shares Adjusted	555 300	
103 Par Or No Par Value	1	
110 Debtors as Surety		
111 Directors Valuation Unlisted Investments	166 700	
112 Market-value Listed Investments	740 800	
113 Directors Valuation of Unconsolidated Subsidiaries		
114 Arrears Cumulative Dividends		
115 Months Covered By Financial Statements	12	

Appendix 6A (continued)

116 Month of Financial Year-end	6	
117 Audit Report Qualified		
118 Inflation-Adjusted Other Fixed Assets	1 199 900	
119 Inflation-Adjusted Depreciation Fixed Assets	152 800	
120 Number of Subsidiaries	19	
121 Number of Foreign Subsidiaries	6	
122 Number of Quoted Subsidiaries	3	
123 Controlled by other Companies	1	
124 Provision for Incremental Replacement Value		
125 Preference Shares issued at Par	1	
126 Directors' Share Holding Dir		
127 Directors' Share Holding Ind	100	
128 Deferred Tax Total	365 000	BS
129 Deferred Tax for Year	51 900	
130 Items not representative of Cash Flow	354 400	
131 Number of Persons Employed	26 797	
132 Stock – Raw Material	59 100	
133 Finished Goods		
134 Merchandise	30 300	
135 Consum Store	28 700	
136 Work Progress	1 900	
137 Uncompl Contrt		
138 Proprietary Profits in Associated Companies	15 600	
139 Tot Res Accrued Ass Co's	105 600	
140 Capital Commitments	848 000	
141 Accumulated Depreciation Land and Buildings	66 000	
142 Long-term Group Loans Advanced	2 000	
143 Short-term Group Loans Advanced		
144 Earnings/share (1 Dec)	707	
145 Long-term Group Loans Received		
146 Short-term Group Loans Received		
147 Notes to Statements		
148 Number of Analysts	6	
149 Average Price Per Share (c)	1151	
150 JSE Price Co Financial Year End (c)	1064	
151 Stock Valuation method	3	
152 Mining Assets		
153 Exploration Amortisation Expenditure written-off		
154 Undeveloped Property		
155 Developed Property less Development Expenditure		
156 Debtors for Prop Sold		
157 Provisions for Future Development		
158 Current Adjustment R1000 To		
162 Trade Creditors	1 421 400	
163 Loan Portion of Tax		
164 Balance Sheet LIFO Stock Adjustment		
165 Income Statement LIFO Stock Adjustment		
166 Leasehold Commitments		
167 Contingent Liabilities	42 9000	
168 Extraordinary Item in Tax		
169 Extraordinary Item in Minority Interest	–4 200	
170 Number of Shares Traded	24 937	
171 Number of Transactions	3 430	
172 Value of Transactions	286 916	
173 Split Factor (3 Dec)	10:1	
174 Month of Stock Split	7	

Appendix 6B: Specifications for the user-defined financial statements

The financial statements below are readapted from the standardised BFA statements for the purposes of this analysis. Only the standardised financial line items and codes indicated in the statements are used below and in the description of the formulae (see Appendix 6D). In addition, several user-defined codes are used to reflect combinations of BFA standardised line items in order to simplify the definitions/descriptions of the financial statement categories. A distinction is made between balance sheet, income statement, cash flow statement and sundry financial items, while a section for an amended income statement is also included to indicate adjustments for inflation.

FINANCIAL ITEM	BFA line code	User-defined code
BALANCE SHEET (BS) – CAPITAL		
Ordinary shares issued	S1	
Non-distributable reserves	S2	
Distributable reserves	S3	
ORDINARY SHAREHOLDERS' INTEREST (CONTROLLING CAPITAL)	S1+S2+S3	**BS1**
Preference share capital	S8	
Minority shareholders' interest	S7	
TOTAL SHAREHOLDERS' INTEREST	S1+S2+S3+S7+S8	**BS2**
Deferred taxation[1]	S128	
Long-term loans	S24	
Secured long-term borrowings	S21	
Debentures	S22	
Other long-term borrowings	S23	
Current liabilities	S37	
Short-term borrowings	S32	
Creditors	S33	
Bank overdraft	S34	
Provision for taxation	S35	
Provision for dividends	S36	
TOTAL DEBT CAPITAL	S24+S37	**BS3**
TOTAL CAPITAL	BS2+S128+S24+ S37	**BS4**
BALANCE SHEET (BS) - ASSETS		
Land and buildings	S10	
Total accumulated depreciation (land and buildings)	S11	
Other fixed assets (equipment, vehicles, etc.)	S12	
Total accumulated depreciation (other fixed assets)	S13	
FIXED ASSETS	S14	
Listed external investments	S18	
Unlisted external investments	S16	
Loans granted	S15	
Unconsolidated interest in subsidiary	S17	
TOTAL EXTERNAL INVESTMENTS	S19	
Cost of control of subsidiaries	S4	
Other intangible assets	S5	
TOTAL INTANGIBLE ASSETS	S4+S5	**BS5**
Stock	S26	
Debtors	S27	
Cash and bank balance	S29	
Short-term loans advanced	S28	
Other current assets	S30	
CURRENT ASSETS	S31	
NET CURRENT ASSETS	(S31–S37) = S38	
TOTAL NET ASSETS	**(S14+S19+S38)**	**BS6**
TOTAL NET OPERATING ASSETS	**(S14+S38–S28)**	**BS7**

Appendix 6B (continued)

INCOME STATEMENT (IS)		
Turnover	S51	
Trading profit - total cost shown	(S54–S71)	
OPERATING INCOME BEFORE DEPRECIATION	(S54–S71)+ (S65+S66)	**IS1**
– Depreciation	(S65+S66)	**IS2**
OPERATING INCOME (S71 represents all deductions for expenditure which have to be published in terms of the Companies Act)	(S54–S71)	**IS3**
+ Interest received	S55	
+ Dividends received	(S56+S57)	**IS4**
+ Income from unconsolidated subsidiaries	S58	
Total investment income	S55+S56+S57+S58	**IS5**
± Non-recurring income/loss	(S60+S61)	**IS6**
+ Extraordinary income	S62	
INCOME BEFORE INTEREST AND TAXATION	S73	
– Interest paid	S74	
INCOME BEFORE TAXATION	S75	
– Taxation[2]	S76+S129	
INCOME AFTER TAXATION	S77–S129	
+ After-tax share in subsidiary income	----	
– Interest of minority shareholders	S78	
DISTRIBUTABLE INCOME	S79	
– Preference dividend	S81	
– Ordinary dividend	S80	
UNDISTRIBUTED INCOME FOR THE YEAR	S82–S129	
INCOME STATEMENT AMENDED FOR INFLATION (AIS)		
INCOME BEFORE INTEREST AND TAXATION (HISTORICAL COST)	S73	
Current cost adjustment:		
– Adjustment for depreciation [3]	S119	
– Adjustment for cost of sales		AIS1
ENTITY OPERATING INCOME		
– Interest paid	S74	
ENTITY INCOME AFTER INTEREST		
± Adjustment for gearing		AIS2
OWNERS' INCOME BEFORE TAXATION		
– Taxation	S76	
OWNERS' INCOME AFTER TAXATION		
+ After-tax share in subsidiary income		
– Interest of minority shareholders	S78	
DISTRIBUTABLE INCOME		
– Preference dividend	S81	
– Ordinary dividend	S80	
UNDISTRIBUTED INCOME IN REAL TERMS		
CASH FLOW STATEMENT (CF)		
INCOME BEFORE INTEREST AND TAXATION	S73	
+ Depreciation	S65+S66	**IS2**
– Profit on sales of fixed assets and investments	S60+S61	**IS6**
– Investment income	S59	
± Decrease/Increase in net current assets	S706	
CASH FROM OPERATING ACTIVITIES	S703–S706	**COA**
+ Investment income	S59	
+ Other income (defined by BFA-NET)	S705	
CASH FROM TOTAL ACTIVITIES BEFORE INTEREST AND TAXATION	COA+S59+S705	**CTA**
– Financing costs	S74	
– Taxation paid	S713	

Appendix 6B (continued)

CASH AVAILABLE FROM TOTAL ACTIVITIES AFTER INTEREST AND TAXATION	S714	**CATA**
– Preference dividend	S716	
– Ordinary dividend	S715	
NET CASH FROM TOTAL ACTIVITIES	S717	**NCTA**
– Expansion and replacement of fixed assets	S719	
+ Proceeds on sale of fixed assets	S724	
Cash utilised for capital investment (CAPS)	–S719+S724	**CF5**
CASH UTILISED BEFORE FINANCIAL INVESTMENT ACTIVITY		
– Increase in financial investments	S720	
– Net investment in subsidiaries (other)	S721	
+ Proceeds on sale of financial investments	S725	
Cash utilised for financial investment	–S720–S721+S725	**CF6**
CASH UTILISED FOR TOTAL INVESTMENT ACTIVITIES		**CIA**
CASH SURPLUS/(SHORTAGE)	NCTA–CIA	**NCTA–CIA**
CASH FROM FINANCING ACTIVITIES		
+ Net increase long-term loans	+S728	
– Net decrease long-term loans	– S728	**CF7**
+ Net increase in short-term loans	+S729	
– Net decrease in short-term loans	– S729	**CF8**
+ Increase in share capital	S730	
+ Other	S731	
CASH GENERATED/(UTILISED)		
SUNDRY INFORMATION ITEMS		
Number of issued shares adjusted to nominal value [4]	S102	
Inflation adjustment for other fixed assets (for example, equipment, vehicles, etc.)[5]	S118	
Inflation adjustment for land and buildings (5 years)[6]		**SI1**
Inflation adjustment for land and buildings (10 years)[6]		**SI2**
Inflation adjustment for depreciation (other fixed assets)	S119	
Inflation adjustment for depreciation (land and buildings, 5 year)[7]		**SI3**
Inflation adjustment for depreciation (land and buildings, 10 year)[7]		**SI4**
Year-end price per share[8]	S150	
Balance sheet LIFO stock adjustment	S164	
Adjustment to weighted number of issued ordinary shares (S102)[9]	(see note)	
Annualisation of financial statements[10]	(see note)	

Notes:

1. Deferred taxation (S128) is treated as neither shareholders' interest nor debt, but generally forms part of total capital. However, it is possible that deferred tax could be regarded as a liability which is payable at some future date, but could also be classified as part of total shareholders' interest, because in effect this taxation is in practice seldom paid in a situation of growth and inflation (see also analysis of Accounting Guideline AC 102 in Vorster, Joubert, Koen and Koornhof, 1996: 40-41). Deferred taxation is included by BFA-NET as a distributable reserve, but for the purposes of the ordinary shareholders' interest and the total shareholders' interest deferred taxation is excluded.

2. The percentual nominal taxation rates (t) applicable during the period of the research, i.e. 1986 to 1992, were as follows: 1986 to 1990 = 50%, while 1991 and 1992 = 48%. This is the provision for taxation which is expected to be payable by the enterprise for the year. The nominal tax rate for the applicable year is used to adjust pre-tax income statement figures to after-tax and vice versa. The effective tax rate paid by various companies differs widely, which consequently would either inflate or deflate the financial figures on a before- or after-tax basis. This is also the rate applicable to incremental income or expenditure because the taxation allowances have already been taken into account, causing the effective tax rate to differ from the nominal tax rate. In order to ensure consistency, the nominal tax rate is used.

3. The adjustment of other fixed assets for inflation requires a similar adjustment to the depreciation of other fixed assets for the financial year. The adjustment is made by applying the percentage increase in the index for Machinery Non-electrical to the depreciation figure for the period. This figure represents the additional depreciation that should be written off the value of other fixed assets to provide for the increase in replacement values.

4. This represents the actual number of ordinary shares issued, but adjusted for partly paid-up shares. The number of shares is reduced in the same ratio as that in which the amount paid-up stands to the nominal value of the shares. If shares are issued during the year, only a portion of the shares are added to the number of a issued shares. The proportional part of the shares included depends on the date on which the cash is received (see analysis of Accounting Guideline AC 104 in Vorster *et al.*, 1996: 116-118).

5. The inflation adjustment of the book value of other fixed assets (all fixed assets such as machinery, equipment, vehicles, but excluding land and buildings) entails adjusting assets such as equipment, vehicles and furniture to reflect an approximate replacement value. This adjustment is based on two factors, namely, the average age of the assets and an index, which in the context of the BFA-NET database is calculated by the Central Statistical Services for Machinery, Non-electrical. It would also be possible to use the production price index or the consumer price index. However, it would be necessary to analyse the annual compounded rate of the composite index (see also Archer, 1981: 111-113). The average age of the assets is determined by accumulated provision for depreciation divided by the depreciation as indicated in the income statement. This average age is used to identify the relevant index figure at the average date. By dividing the index at acquisition date into the index at the end of the financial year (balance sheet date), subtracting one from this figure and multiplying the result by the appropriate fixed assets offers an estimate of the revaluation of fixed assets (BFA Version 8.0, 1997 and Lambrechts, 1997: 261-269). Hamman and vd M Smit (1994: 221) suggest that the use of the Cutler and Westwick method (used in the BFA-NET database) to estimate the average age of fixed assets is inclined to provide adjustments which are inaccurate.

6. The inflation adjustment of the book value of land and buildings entails adjustment to reflect an approximate replacement (market value) value for the asset. This adjustment is based on two factors, namely, the average age of the assets and an index, which in the context of the calculations is based on the Production Price Index (PPI) and calculated by the Central Statistical Services. The all-item PPI is used, and not Machinery, Non-electrical, due to the limited focus of the latter index. However, the Machinery, Non-electrical index forms part of the all-item PPI index. The base year for the PPI index is 1986, which also forms the neutral year of the research period, i.e. no economic growth or decline occurred during 1986 (see also Archer, 1981: 111-113).

7. In certain instances depreciation is also written off on land and buildings. To compensate for the effects of inflation, the depreciation on land and buildings as reflected in the income statement is also adjusted for inflation on both an estimated five- and ten-year revaluation. The method of calculation is the same as for other fixed assets (see point 1 above).

8. The year-end price per share is used as opposed to the average price per share due to the number of shares representing a balance sheet item, which is a figure that reflects the number of ordinary issued shares at a particular date. The year-end price as calculated by BFA-NET is determined by dividing the total monetary value of shares sold during the last month of the financial year by the number of shares sold during the last month. Although this figure does not reflect the price at year-end, but over the last month of the financial year, it is regarded as appropriate for the purposes of analysis in this study.

9. Due to significant changes in the number of adjusted ordinary shares (S102) of enterprises included in the analysis over the period 1987 to 1992, a reconciliation was required. It was necessary to reconcile the number of issued ordinary shares for 29 enterprises using cumulative share adjustments. The information for the reconciliation was obtained from the annual financial statements of the enterprises and/or the JSE Monthly Bulletin which includes, among other things, information on stock splits, capitalisation issues and rights issues. For the purposes of the adjustment, stock splits, capitalisation issues and consolidations were included, while share schemes, bonus dividends, changes as a result of mergers and rights issues were excluded.

The process involved adjusting the number of shares in a particular year of the analysis and reconciling the years prior to the adjusted year with the adjustment factor. The relevant adjustments were made to the number of issued ordinary shares of several financial performance indicators which include earnings per share, dividend per share, cash flow per share, cash flow-price earnings and inflation-adjusted earnings per share.

For instance, Pacific Asia announced a stock split of 10 for 1 in 1989. This resulted in the number of issued ordinary shares increasing from 696 300 to 6 963 000. Portland Holdings is another enterprise that announced a stock split of 2 for 1 in 1988. The number of issued ordinary shares increased from 14 332 816 to 28 665 632 due to the stock split.

10. In certain instances a company changes the date of its financial year-end. This adaptation implies that the number of months covered by the financial statements would either exceed 12 months or be less than 12 months. In order to ensure that results are comparable, it is necessary to annualise (conform to a 12-month period) the financial ratios of the applicable companies.

Appendix 6C: User-defined balance sheet, cash flow statement and inflation–adjusted balance sheet for SAFREN 1995

USER-DEFINED BALANCE SHEET FOR SAFREN 1995	
BALANCE SHEET (BS) – CAPITAL	
Ordinary shares issued	27 800
Non-distributable reserves	1 145 200
Distributable reserves	1 199 500
ORDINARY SHAREHOLDERS' INTEREST (CONTROLLING CAPITAL)	2 372 500
Preference share capital	1 700
Minority shareholders' interest	1 918 000
TOTAL SHAREHOLDERS' INTEREST	4 292 200
Deferred taxation[1]	365 000
Long-term loans	1 233 200
Secured long-term borrowings	886 700
Debentures	-----
Other long-term borrowings	346 500
Current liabilities	1 972 300
Short-term borrowings	227 700
Creditors	1 421 400
Bank overdraft	122 100
Provision for taxation	70 500
Provision for dividends	130 600
TOTAL DEBT CAPITAL	3 205 500
TOTAL CAPITAL	**7 862 700**
BALANCE SHEET (BS) - ASSETS	
Land and buildings	2 152 100
Total accumulated depreciation (land and buildings)	66 000
Other fixed assets (equipment, vehicles, etc.)	4 769 900
Total accumulated depreciation (other fixed assets)	1 880 300
FIXED ASSETS	4 975 700
Listed external investments	385 300
Unlisted external investments	166 400
Loans granted	147 600
Unconsolidated interest in subsidiary	-----
TOTAL EXTERNAL INVESTMENTS	699 300
Cost of control of subsidiaries	-----
Other intangible assets	-----
TOTAL INTANGIBLE ASSETS	-----
Stock	120 000
Debtors	1 079 700
Cash and bank balance	481 700
Short-term loans advanced	494 800
Other current assets	11 500
CURRENT ASSETS	2 187 700
TOTAL NET ASSETS	**7 862 700**

Appendix 6C (continued)

ADJUSTED CASH FLOW STATEMENT FOR SAFREN 1995	
INCOME BEFORE INTEREST AND TAXATION	1 023 000
+ Depreciation [S65+S66 + write-off (300)]	349 100
– Profit on sales of fixed assets and investments	
– Investment income [N5 (102024)+N2(8299)+N30.2 (13464+10052+145)]= 133984 (S59)	(134 000)
+– Decrease/Increase in net current assets (S706)	(122 700)
CASH FROM OPERATING ACTIVITIES [COA] [S703(1238100) + S706 (122700)]	**1 115 400**
+ Investment income [N5 (102024)+N2(8299)+N30.2 (13464+10052+145)]= 133984 (S59)	134 000
+ Other income (defined by BFA-NET) (S705)	-----
CASH FROM TOTAL ACTIVITIES BEFORE INTEREST AND TAXATION [CTA]	**1 249 400**
– Financing costs [N5(175137–19180)] (S74)	(155 900)
– Taxation paid N30.4 (S713)	(124 700)
CASH AVAILABLE FROM TOTAL ACTIVITIES AFTER INTEREST AND TAXATION [CATA] (S714)	**968 800**
– Preference dividend (S716)	(100)
– Ordinary dividend N30.5–S716 (S715) (included dividends to minority interest)	(382 300)
NET CASH FROM TOTAL ACTIVITIES [NCTA] (S717)	**586400**
– Expansion and replacement of fixed assets (S719)	(877 700)
+ Proceeds on sale of fixed assets (S724)	222 500
Cash utilised for capital investment (–S719+S724)	(655 200)
CASH UTILISED BEFORE FINANCIAL INVESTMENT ACTIVITY	
– Increase in financial investments (S720)	(64 700)
– Net investment in subsidiaries (other) (S721)	(1 400)
+ Proceeds on sale of financial investments (S725)	61 200
Cash utilised for financial investment (–S720–S721+S725)	(2 100)
CASH UTILISED FOR TOTAL INVESTMENT ACTIVITIES [CIA]	**(657 300)**
CASH SURPLUS/(SHORTAGE) [NCTA–CIA]	**(70 900)**
CASH FROM FINANCING ACTIVITIES	
+ Net increase long-term loans (S728)	
– Net decrease long-term loan (S728)	(223 800)
+ Net increase in short-term loans (S729)	293 000
– Net decrease in short-term loans (S729)	
+ Increase in share capital (S730)	1 700
+ Other (S731)	
CASH GENERATED/(UTILISED)	**70 900**

* The user-defined cash flow statement was also applied to Wooltru as an additional control case

Appendix 6C (continued)

INFLATION-ADJUSTED BALANCE SHEET FOR SAFREN 1995		
MONETARY LIABILITIES	(S24+S37=total debt)	
	1 233 200+1 972 300	3 205 500
Less: **MONETARY ASSETS** (MA)		1 709 000
Debtors (S27)	1 079 700	
Cash (S29)	481 700	
Trade investments (S19)	147 600	
NET MONETARY LIABILITIES (NML)		**1 496 500**
OTHER CREDIT BALANCES (XML)		**4 657 200**
Total shareholders' interest + deferred taxation (BS2+S128)	5 022 200	
Less: Deferred taxation (also included in distributable reserves)	365 000	
NML + XML		**6 153 700**
ASSETS (BS5+S14+S19+S31)		**7 862 700**
Fixed assets	4 975 700	
Investments	699 300	
Current assets	2 187 700	
Less MA		**1 709 000**
NON-MONETARY ASSETS (XMA)		**6 153 700**

Notes on the use of investments in the user-defined inflation-adjusted balance sheet:

1. Long-term loans advanced (S15): This item is considered at book value and regarded as monetary assets.
2. Unlisted investments (S16): If the director valuation of unlisted investments is smaller (<) than the book value, the investments are regarded as monetary assets, otherwise as non-monetary assets.
3. Listed investments (S18): If the market value of unlisted investments is smaller (<) than the book value, the investments are regarded as monetary assets, otherwise as non-monetary assets.
4. Share in unconsolidated subsidiary (S17): This item is considered at book value and included as a monetary asset.

Sundry items used from the BFA-NET list for the calculation of the inflation-adjusted ratios	
102 Number of Ordinary Shares Adjusted	555 300
111 Directors Valuation Unlisted Investments	166 700
112 Market-value Listed Investments	740 800
118 Inflation-Adjusted Other Fixed Assets	1 199 900
119 Inflation-Adjusted Depreciation Fixed Assets	152 800
128 Deferred Tax Total	365 000
129 Deferred Tax for Year	51 900
149 Average Price Per Share (c)	1 151
150 JSE Price Co Financial Year End (c)	1 064
Additional sundry items relevant to the calculation of the financial performance indicators	
239 Weighted average cost of capital (WACC)	0,178
240 Cost of equity (K_e)	0,193
241 Cost of sales	9 671
242 Revaluation: land and buildings (5 years)	1 128 682
243 Depreciation land and buildings (5 years)	3 787
244 Revaluation: land and buildings (10 years)	4 278 153
245 Depreciation land and buildings (10 years)	14 356
246 Total capital (TC)	7 862 700
247 Inflation-adjusted assets (5 years)	8 574 782
248 Monetary assets (MA)	1 709 000
249 Non-monetary assets (XMA)	6 153 700
250 Monetary liabilities (ML)	3 205 500
251 Non-monetary liabilities (XML)	4 657 200
252 ML – MA (control) if (+) NML; if (–) NMA	1 496 500
253 MA > ML: Net monetary assets (–)	130 628
254 ML > MA: Net monetary liabilities (+)	29 332
255 Annualise statements	1

Appendix 6D: The method of calculation for each indicator included in the analysis

The following financial information is used to calculate the financial performance indicators used for the statistical analysis in the following chapters. This standardised information forms part of the Bureau for Financial Analysis, University of Pretoria financial database (BFA-NET, Version 8.August 1997) (see also Appendix 6B). The formula for each financial performance indicator is provided below on a before- and after-tax basis where applicable.

Category and ratio description	Formulae as per BFA line code and input into the data base	Unit
Profitability (before and after tax) performance indicators (15)		
X1 Return on total net assets (RONA) (before tax)	(IS3+IS5)/(BS6)*100	%
X1A Return on total net assets (RONA) (after tax)	((S77–S129)+((S74)–(IS6+S62))*(1–t))/ (BS6)*100	%
X2 Return on total shareholders' interest (ROE) (before tax)	(IS3+IS5)–S74/(BS2–S128)*100	%
X2A Return on total shareholders' interest (ROE) (after tax)	(((S77–S129)–(IS6+S62))*(1–t))/ (BS2–S128)*100	%
X3 Return on ordinary shareholders' interest (ROSE) (before tax)	((IS3+IS5)–(S74)–(S81)/(1–t))/(BS1–S128)*100	%
X3A Return on ordinary shareholders' interest (ROSE) (after tax)	(((S77–S129–S81)–(IS6+S62))*(1–t))/(BS1–S128)*100	
X4 Return on net operating assets (RNOA) (before tax)	(IS3)/(BS7)*100	%
X4A Return on net operating assets (RNOA) (after tax)	(((S77–S129)+(((S74)–(IS6+S62))*(1–t))–(S55*(1–t)))–(IS4))/(BS7)*100	%
X5 Return on sales (ROS) (before tax)	(IS3+IS5)/(S51)*100	%
X5A Return on sales (ROS) (after tax)	((S77–S129)+((S74)–(IS6+S62))*(1–t))/ (S51)*100	%
X6 Net income margin (before tax)	((S75)–(IS6+S62))/(S51)*100	%
X7 Earnings per share (EPS)	As per the company's financial statements	C
X8 Dividend per share (DPS)	Interim +final dividend as declared by the company	C
X9 Turnover to total net assets	(S51)/(BS6)*100	%
X10 Interest-bearing debt to total shareholders' interest	(S24+S32+S34)/(BS2–S128)*100	%
Growth performance indicators (9)		
X11 Net turnover	(S51(current)–S51(previous))/ S51 (previous)*100	%
X12 Dividend per share (DPS)	(X8(current)–X8(previous))/ X8 (previous)*100	%
X13 Earnings per share (EPS)	(X7(current)–X7(previous))/ X7 (previous)*100	%
X14 Attributable earnings	((S79–S129–S81)(current)– (S79–S129–S81) (previous))/ (S79–S129–S81)(previous)*100	%
X15 Total net assets	((BS6)(current)–(BS6)(previous))/ (BS6)(previous)*100	%
X16 Total shareholders' interest	(BS2–S128)(current)–(BS2–S128)(previous)/ (BS2–S128)(previous)*100	%
X17 Internal growth rate (after tax)	(RONA × Retention Rate (B))/ [1– (RONA × B)], where: **RONA**: X1A **B:** (S82–S129)/(S79–S129–S81)*100	%
X18 Sustainable growth rate (after tax)	(ROE × Retention Rate (B))/ [1– (ROE × B)], where: **ROE**: X2A **B:** (S82–S129)/(S79–S129–S81)*100	%
X19 Growth in cash from operating activities	COA (current) –COA (previous)/ COA (previous)*100	%

Appendix 6D (continued)

Cash flow performance indicators (19)*		
X20 Cash flow (CTA) to total net assets	(CTA)/(BS6)*100	%
X21 Cash flow (COA) to total net operating assets	(COA)/(BS7)*100	%
X22 Cash flow (CATA) to total shareholders' interest	(CATA)/(BS2–S128)*100	%
X23 Cash flow (CATA less preference dividend) to ordinary dividend payments (dividend coverage)	(CATA–S716)/(S715)*100	%
X24 Cash flow (CTA) to interest payments	(CTA–S713)/(S74*(1–t))*100	%
X25 Cash flow (CATA) to total debt	(CATA)/(BS3)*100	%
X26 Cash flow (CATA) to current liabilities	(CATA)/(S37)*100	%
X27 Cash flow (CATA less preference dividend) to capital redemption	(CATA–S716)/((CF7+CF8)*(–1))*100 if: CF7 and/or CF8 negative multiply by (–1)	%
X28 Cash flow (CATA) to [long-term loans repaid + fixed asset purchases + total dividend paid]	(CATA)/(CF7+S719+S715+S716)*(–1)* 100 if: CF7 negative multiply by (–1)	%
X29 Cash flow (NCTA) to [gross non-current assets and net current assets]	(NCTA)/(S10+S12+S38)*100	%
X30 Cash flow (NCTA) to capital investments	(NCTA)/(CF5)*100	%
X31 Cash flow (NCTA) to financial investments	(NCTA)/(CF6)*100	%
X32 Cash flow (NCTA) to [capital investments + financial investments + capital redemption]	(NCTA)/((CF5+CF6)+((CF7+CF8)*(–1)))*100 if: CF7 and/or CF8 negative multiply by (–1)	%
X33 Cash flow (CATA) to turnover	(CATA)/(S51)*100	%
X34 Cash flow (CATA less preference dividend) per ordinary share	(CATA–S716)/(S102)*100	%
X35 Price per share to cash flow (CATA less preference dividend) per share	(S150/100)/((CATA–S716)/S102)*100	%
X36 Working capital to operating cash flow	(S706/(S73+IS2))*100: if S706 is negative multiply by (–1)	%
X37 Cash flow (CATA) to net income after tax (earnings)	(CATA)/(S77–S129)*100	%
X38 Cash flow (CTA) less interest paid to net income before tax	(CTA–S74)/(S75)*100	%

*** Abbreviations used to define elements in the cash flow statement**

COA	Cash from operating activities
CTA	Cash from total activities before interest and taxation
CATA	Cash available from total activities after interest and taxation
NCTA	Net cash from total activities

Value performance indicators (9)		
X39 Economic value added (EVA): Total capital (TC)*(RONA–WACC) (after tax)	**TC**: BS4–S128 **RONA**: X1A **WACC** = (1–L)K_e+L(K_d)(1–t), where: t = tax rate and L=total debt/total capital	Value
X40 Market value-added ratio (MVAR): (Market value of equity (MVE) + Interest bearing debt)/ Total capital (TC)	**MVE**: (S102*(S150/100))+S7+ S8) **Interest-bearing debt**: (S24+S32+S34) **TC**: BS4–S128	%
X41 Q-ratio: (Market value of equity (MVE) + Interest-bearing debt)/ Inflation-adjusted fixed assets	**MVE:** ((S102*(S150/100))+ S7+S8) **Interest-bearing debt**: (S24+S32+S34) **Inflation-adjusted fixed assets**: (S14+S118+ (SI1)+S38+S112+S111+S17+S15+ S164+BS5	%
X42 Profitability index: (RONA (after tax)/WACC)	**RONA**: X1A **WACC** = (1–L)K_e+L(K_d)(1–t), where: t = tax rate and L=total debt/total capital	%
X43 Profitability index: (ROE (after tax)/K_e)	**ROE**: X2A **K_e** = [(WACC–L(K_d)(1–t)]/(1–L)	%
X44 Value index: Market value of equity to book value of ordinary shareholders' interest	((S102)*(S150/100))/BS1*100	%
X45 Value index: Market value of equity to book value of equity per share	((S150/100)/((BS1–S128)/S102))*100	%
X46 Value index: Internal return versus required return	ROE (after tax)/Earnings yield (K)*100, where: **ROE**: X2A **K**: ((S79–S129–S81)/S102)/ (S150/100)*100	%

Appendix 6D (continued)

X47 Warranted equity value (WEV) to book value of equity (BVE)	(ROE–g)/(K_e–g)*100, where: **ROE**: X2A **g** = Avg[(BS2–S128$_{present}$–BS2–S128$_{previous}$)/ BS2–S128$_{previous}$] **K_e** = [WACC–L(K_d)(1–t)]/(1–L)	%
Inflation-adjusted traditional performance indicators (7)✓		
X48 Return on total net assets (RONA)	(S73–S119–SI3–(AIS1)±(AIS2)–(IS6+S62))/ (BS6+S118+SI1+S164)*100	%
X48(b) Return on total net assets (RONA)	(S73–S119–SI4–(AIS1)±(AIS2)–(IS6+S62))/ (BS6+S118+SI2+S164)*100	%
X49 Return on total shareholders' interest (ROE)	(S73–S119–SI3–(AIS1)±(AIS2)–(IS6+S62)–S74) / (BS2–S128+S118+SI1+S164)*100	%
X49(b) Return on total shareholders' interest (ROE)	(S73–S119–SI4–(AIS1)±(AIS2)–(IS6+S62)–S74)/ (BS2–S128+S118+SI2+S164)*100	%
X50 Return on ordinary shareholders' interest (ROSE)	(S73–S119–SI3–(AIS1)±(AIS2)–(IS6+S62)–S74–(S81/(1–t)))/ (BS1–S128+S164+ S118+SI1)*100	%
X50(b) Return on ordinary shareholders' interest (ROSE)	(S73–S119–SI4–(AIS1)±(AIS2)–(IS6+ S62)–S74–(S81/(1–t)))/ (BS1–S128+S164+ S118+SI2)*100	%
X51 Earnings per share (EPS)	(S79–S129–S119–SI3–(AIS1)±(AIS2)–S81)/ S102*100	%
X52 Return on sales (ROS)	((IS3+IS5)–S119–SI3–(AIS1)±(AIS2))/ S51*100	%
X53 Dividend coverage ratio	(S79–S129–S119–SI3–(AIS1)±(AIS2)–S81)/S80*100	%
X54 Net income margin	((S75)–(IS6+S62)–S119–SI3–(AIS1)±(AIS2))/ S51*100	%
✓ Several limitations such as the average age of fixed assets are encountered with the disclosure of information with regard to land and buildings in the financial statements of enterprises. Inflation-adjusted ratios, which include land and buildings, are calculated on the basis that land and buildings are revalued on the premise of a five-year and ten-year average age respectively. The indicators which use a ten-year average age for land and buildings are indicated by a "b" in the table above.		

GLOSSARY

Financial item with BFA code	Description of financial item
INFLATION-ADJUSTED DESCRIPTIONS	
Adjustment for cost of sales	Stock (S26) (end of previous year)*[Index mid-year/Index (start of financial year)–1] + Stock (S26) (end of financial year)*[1– (Index mid-year/Index at year-end)]
Revaluation of land and buildings (SI1)	(Production Price index at year-end/Production price index at acquisition date)–1* Book value of land and buildings (S10–S11) An average age of five and ten years is applied to land and buildings over the period 1987 to 1992 (see also Archer, 1981: 103, 114, 187).
Total capital (adjusted for inflation) BS2+S128+S118+S164+(SI1)+S24+S37 **Note:** The inclusion of individual inflation adjustments for land and buildings and other fixed assets could lead to double counting because certain companies already include a revaluation of total fixed assets as part of non-distributable reserves. This implies that the adjustments are already included in BS2. However, the inflation adjustment is included here to partially compensate for those enterprises which revalue land and buildings, but do not adjust other fixed assets for inflation, or have not revalued land and buildings, but included an inflation adjustment for other fixed assets.	The book value of ordinary shareholders' interest and preference share capital, equity equivalents, minority shareholders' interest (S7) and total debt (S24+S37). Equity equivalents include deferred taxes (S128), the LIFO reserve (S164), and an inflation adjustment to other fixed assets (S118) (calculated by BFA-NET). The latter is included to indicate the effect of a revaluation of other assets such as vehicles and equipment, while the revaluation of land and buildings is considered as a separate adjustment (SI1)
Adjustment for gearing	Monetary assets (MA): S27+S29+S15+S17 Monetary liabilities (ML): S24+S37 Non-monetary liabilities (XML): BS2–S128* Non-monetary assets (XMA): (S4+S5+S14+S19+S31)–(MA) If, MA>ML: Net monetary assets (NMA): NMA* percentage change in PPI index figure = gearing adjustment If, MA<ML: net monetary liabilities(NML): NML/(NML + XML + Revaluation)* Current cost adjustment (Cost of sales and Depreciation) = gearing adjustment **Note**: Deferred tax is already included in distributable reserves and is therefore subtracted
VALUE-ADDED DESCRIPTIONS	
Cost of debt	A long-term borrowing rate as indicated in the BFA-NET database, which is after tax to reflect the tax benefit of debt financing.
Beta (risk multiplier)	The risk multipliers used to calculate the cost of equity are also used in the BFA-NET database.
Weighted average cost of capital	The figure is used as calculated by E. W. Balderson and applied to the BFA-NET database

Cost of equity	Estimated as the risk-free rate plus the beta multiplied by the market risk premium to reflect the risk related to the enterprise's equity as defined by BFA-NET.

For each of the enterprises included in the analysis the cost of equity was calculated in the following manner:

The WACC of each enterprise included in the BFA-NET database as calculated by E. W. Balderson is mathematically adapted by using information available in the database which includes:

- L = the debt ratio which implies total debt to total capital
- K_d = the cost of long-term debt taken as an average for a particular year
- T = the nominal tax rate payable by the company in a particular financial year over the period of the analysis

$$WACC = (1-L)K_e+L(K_d)(1-t)$$

$$\therefore \quad K_e = [WACC-L(K_d)(1-t)]/(1-L)$$

Note: An illustration of the weighted average cost of capital (WACC) and cost of equity (K_e) calculation used in the BFA-NET database is provided for two enterprises, Engen and Protea Furnishers (Profurn), and indicated in Appendix 4.

The cost of long-term debt, the risk-free rate and the market premium are determined by E. W. Balderson and applied to the enterprises in the BFA-NET database (see E. W. Balderson, 1993; Bureau for Financial Analysis, 1994).

CHAPTER 7

PATTERNS IN FINANCIAL PERFORMANCE INDICATORS OF CAPITAL AND LABOUR INTENSIVE ENTERPRISES DURING AN UPSWING AND A DECLINE OF THE ECONOMIC CYCLE BASED ON A SINGLE REPRESENTATIVE MEASURE

7.1 Introduction

The findings reported in this chapter expand on the work completed in Chapters 5 and 6. Chapter 5 includes the specification of the research period (1987-1992), which corresponds to an upswing (1987-1989) and decline (1990-1992) phase in the economic cycle. In addition, a distinction is also made between the capital and labour intensive nature of enterprises listed in the industrial sector of the JSE. It is possible to distinguish between 33 CI and 36 LI enterprises. Chapter 6 highlights the selection and calculation of various financial ratios included in the primary analysis. A total of 62 ratios are initially included in the study. However, due to a lack of data from the cash flow statements of the included enterprises for 1986 it is not possible to calculate growth in operating cash flow (X19) and the indicator is discarded at this stage. The statistical analysis is based on 61 financial performance indicators.

The use of the selected financial performance indicators together with the nature of an enterprise's activities and the fluctuations in the economic cycle form the basis of the analysis in this chapter. A single representative measure, which is an average of the three-year upswing and three-year decline period, is used in the analysis conducted in this chapter. A mean and median value is calculated from the average of the three-year upswing and decline periods for the CI and LI enterprises for each of the ratios.

The objective of this chapter is to statistically investigate the patterns exhibited by the selected financial indicators in order to enable a comparison of their behaviour in CI and LI enterprises during an upswing and decline in the economic cycle. A further aim is to investigate statistically significant differences between the behaviour of the financial performance

indicators for CI and LI enterprises during the upswing and decline phases of the economic cycle.

The first part of the chapter considers the use of the median profile of the ratios for the CI and LI enterprises. Exploratory data analysis techniques are used to describe the patterns and highlight initial differences between the CI and LI enterprises during either or both the upswing and decline phases of the economic cycle. The second part of the chapter covers the use of multivariate techniques as well as non-parametric techniques to determine statistically significant differences between CI and LI enterprises. Mean profiles are compiled to complement the median profiles analysed in the first section. A comparison of the mean and median profiles also enables the identification of possible outlier values among the CI and LI enterprises. The mean profile of those ratios adhering to the required assumptions are also used to highlight differences between the CI and LI enterprises over the total period and during either or both the upswing and decline phases of the economic cycle.

7.2 Methodology

The methodology involves, firstly, the compilation of mean and median profiles for each of the financial indicators. The patterns identified are analysed and classified into primary groups on the basis of the median profile. This classification of the median patterns enables a comparison of the behaviour of the ratios between CI and LI enterprises during an upswing and decline phase in the economic cycle. A notched box and whisker plot of the median is also compiled for each indicator in order to investigate preliminary significant differences between CI and LI enterprises for the upswing and decline phases.

The second part of the analysis involves the application of non-parametric statistical techniques to the median profile of each variable in order to determine whether or not statistically significant differences occur between CI and LI enterprises during both the upswing and decline phases. The mean profiles for each variable are used together with the median profiles to visually identify and further confirm the effect of outlier values. A 5% and 10% trimmed mean are determined for the purposes of identifying and eliminating the influence of possible outliers.

Furthermore, the profile of the mean for those ratios that adhere to the required assumptions is used to analyse whether or not the CI and LI profiles are parallel over the upswing and decline phase. As part of the profile analysis, Hotelling's T^2 test statistic is used to determine whether or not statistically significant differences occur between CI and LI enterprises when the upswing and decline phase are considered together for each of the independent groups. Confidence limits are used to establish significant differences between CI and LI enterprises for the individual upswing and decline phases of the economic cycle.

7.3 Descriptive analysis of the financial performance indicators

A first glance at the calculated financial performance indicators of the CI and LI groups of enterprises highlights several potential problems with the data set. These include missing values in certain instances and possible outlier values, both which may cause distortions and affect the results obtained from the application of certain statistical techniques.

In order to obtain an indication of the underlying characteristics of the financial indicators provisionally included in the study, a descriptive analysis was performed. Ezzamel, Mar-Molinero and Beecher (1987) indicate that the literature offers three common observations that are typically found in a data set composed of financial performance indicators. Firstly, they conclude that most financial ratios indicate positive skewness, which could be attributed to an effective lower limit of zero, but an indefinite upper limit for most ratios. Secondly, financial indicators that depart considerably from normality are characterised by extreme outliers. Thirdly, they observe that the transformation of raw data variables tends to improve approximations of normality, but does not necessarily solve the outlier problem.

Several descriptive statistical measures are used in this chapter to describe the financial ratio data. These include measures of central tendency (mean and median), measures of dispersion (standard deviation and inter-quartile range) and the skewness and kurtosis coefficients. The latter two measures offer an indication of possible deviations from a normal distribution. The descriptive analysis was performed on the ratios for both groups of LI and CI enterprises during the upswing and decline phases of the economic cycle. The descriptive measures indicated above are presented in Appendix 7A for the CI and LI enterprises, for both the

upswing and decline phases. The mean, 5% and 10% trimmed mean values for the CI and LI enterprises during the upswing and decline phases are also presented in Appendix 7A.

The descriptive analysis confirms to a large extent the observations of Ezzamel *et al.* (1987) that many of the ratios indicated significant deviations from normality, while a large portion of the ratios indicate positive skewness for both CI and LI enterprises during both the upswing and decline phases. The return on net operating assets (X4), earning per share (X7) and growth in net turnover (X11) are examples of ratios which exhibit the characteristics highlighted by Ezzamel *et al.* (1987). In contrast to Ezzamel *et al.* (1987), it is possible that several of the ratios such as economic value added included in this study indicated an effective lower limit of less than zero. In several of the ratios the presence of outlier data points are observed. Severe skewness and abnormal kurtosis were also observed in certain instances. Those performance indicators which have skewness and kurtosis coefficients of less than one also have a mean and median that do not indicate major differences. It appears that more ratios indicate deviations from normality for both CI and LI enterprises during the upswing than is the case in the decline phase. In view of the descriptive analysis the median is the appropriate measure of location for many of the ratios and non-parametric statistics are used for further statistical analysis of these variables.

7.4 Exploratory Data Analysis (EDA) as a method to identify and analyse mean and median patterns exhibited by financial performance indicators

EDA is used as an initial process to analyse the financial performance indicators and determine possible patterns in financial performance. This procedure offers various techniques to analyse and make cautious deductions from primarily graphical representations (Tukey, 1977). As applied to this research, the EDA procedures consist of notched box and whisker plots together with median plots. The median, which is not affected by outlier values, in contrast to the mean, is used as a measure to analyse the patterns evident in the financial performance indicators. The notched box and whisker plots confirm the descriptive analysis and indicate the presence of outliers (defined as a value 1,5 times the inter-quartile range from the box part of the plot) as well as skewness and consequently possible deviations from normality in several of the variables. The notched box and whisker plots of each ratio for the CI and LI enterprises covering both the upswing and decline phases are highlighted in

Appendix 7B. The analysis was conducted by using the statistical software packages Statistica (Statsoft, 1998) and S-PLUS (MathSoft, 1997).

A total of 61 graphical representations were compiled of the various financial performance indicators. The first part of the representation indicates a line graph of the median (median plot) for both CI and LI groups for the upswing and the decline period. The second part of each presentation comprised four notched box and whisker plots for LI 1987-1989, LI 1990-1992, CI 1987-1989 and CI 1990-1992 respectively (see Figure 7.1).

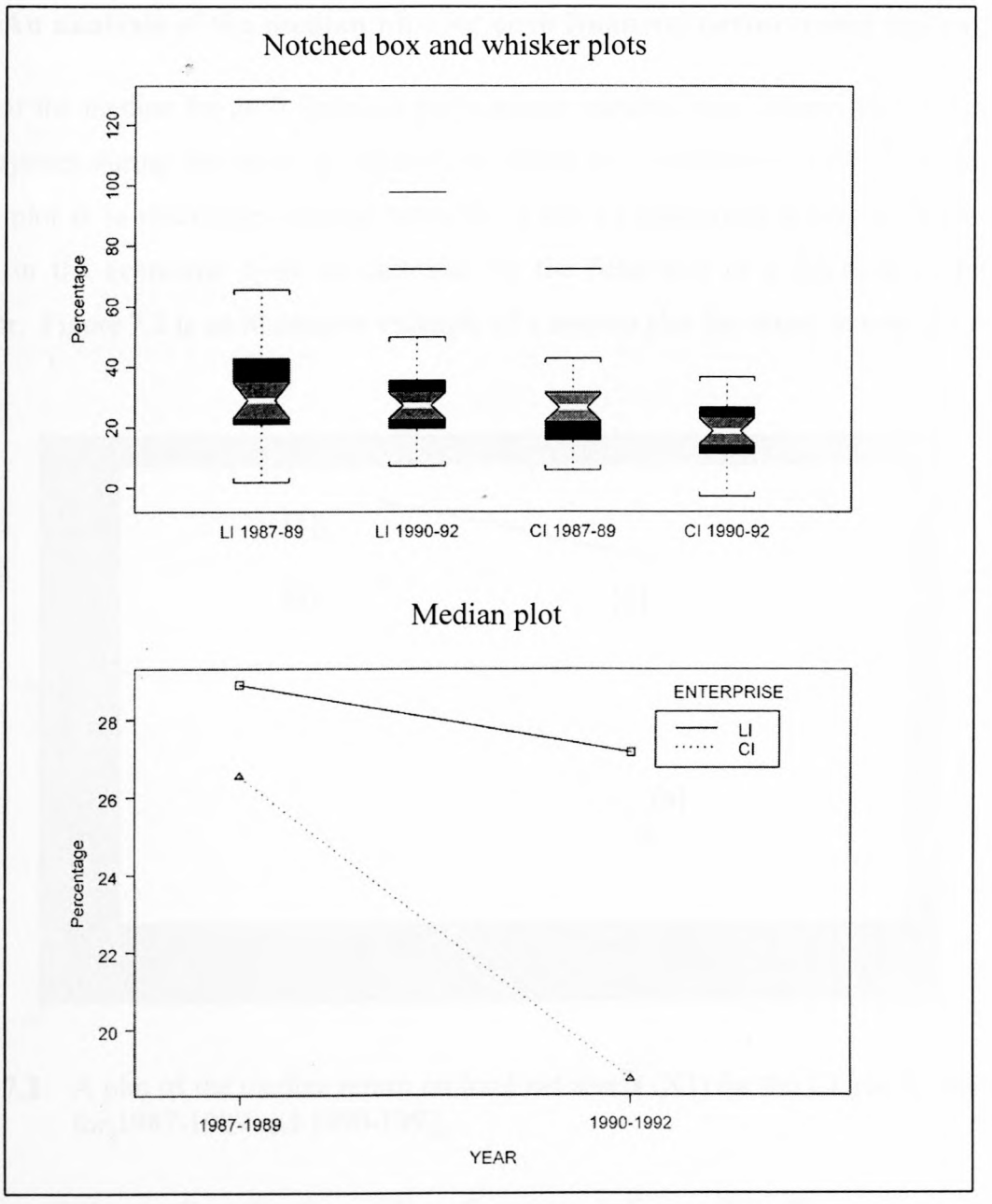


Figure 7.1. Median and notched box and whisker plots for return on total net assets (X1)

A comparison of the notched box and whisker plots of each financial performance measure indicates that it is possible to highlight the following differences between CI and LI and/or within a particular group, i.e. a) between CI and LI groups for the same financial period - for example, LI 1987-1989 and CI 1987-1989; b) within LI or CI groups for different financial periods - for example, LI 1987-1989 and LI 1990-1992; c) between CI and LI groups for different financial periods - for example, LI 1987-1989 and CI 1990-1992. For the purposes of this chapter the financial performance indicators are analysed in terms of the upswing and decline phase for both groups of CI and LI enterprises.

7.4.1 An analysis of the median plot for each financial performance indicator

A plot of the median for each financial performance variable was constructed for the LI and CI enterprises during the upswing and decline phases of the economic cycle. The aim of the median plot is to determine patterns between CI and LI enterprises during an upswing and decline in the economic cycle as indicated by the behaviour of a financial performance indicator. Figure 7.2 is an illustrative example of a median plot for return on total net assets.

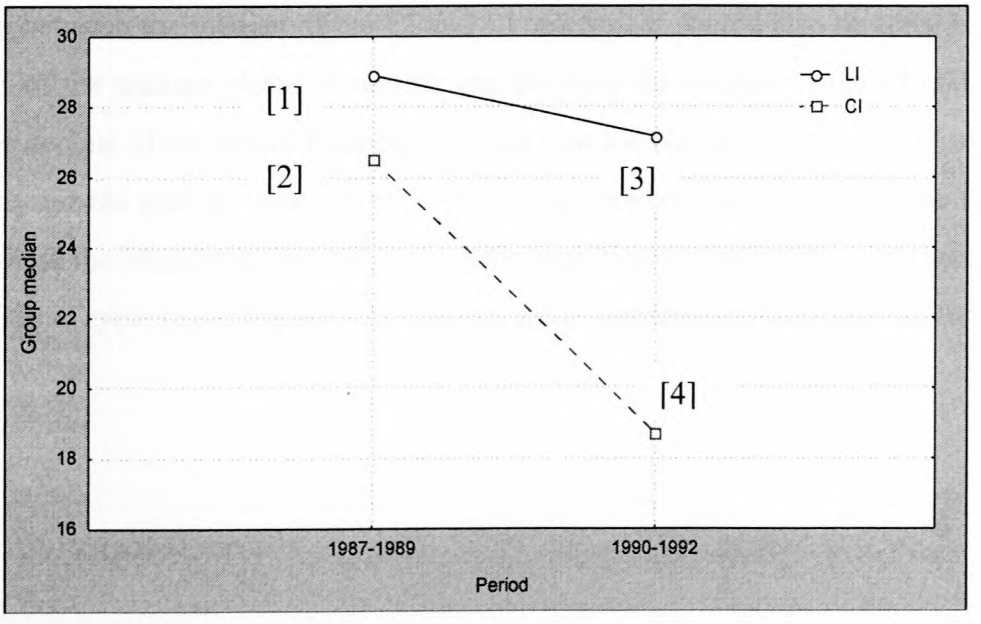


Figure 7.2: A plot of the median return on total net assets (X1) for the CI and LI enterprises for 1987-1989 and 1990-1992

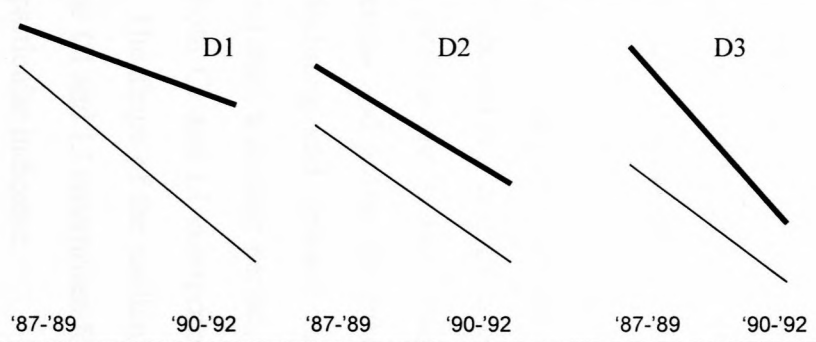
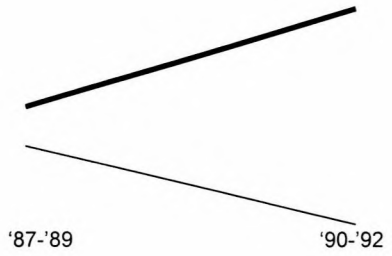
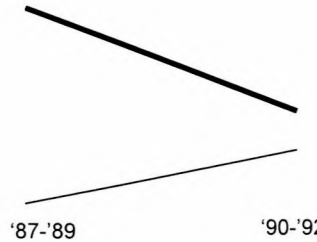
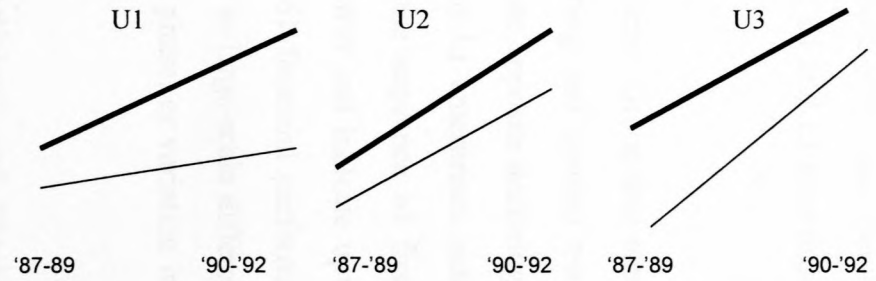
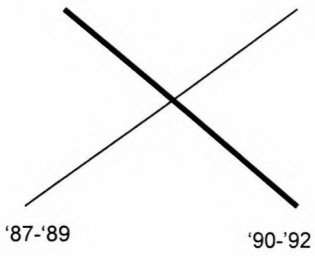
The plot of the median for financial performance indicator X1 offers several possible interpretations of patterns obtained for the CI and LI enterprises. However, as indicated

previously, a distinction is made between CI and LI for the upswing and decline phases of the economic cycle. The linear plot indicated in Figure 7.2 is interpreted by comparing the extent of the gap between the medians represented by numbers [1] and [2] as well as the gap between [3] and [4]. Firstly, it shows that LI enterprises have a higher median return on total net assets than CI enterprises in both an upswing and decline period. Secondly, the pattern of the graph reveals this difference to be much larger during the decline phase of the economic cycle.

A median plot for the two phases of the economic cycle was constructed for each of the 61 financial performance indicators. An observation of the median plot may indicate that the median for the LI enterprise in the upswing phase could be larger than the median in the decline phase or the opposite may occur that the median in the upswing phase is lower than in the decline phase. The same situation is applicable to CI enterprises.

Furthermore, the median for CI or LI enterprises during both phases of the economic cycle may be similar, which would imply a horizontal straight line. On the basis of the size of the median for both the CI and LI groups of enterprises during the upswing or decline it is possible to consider whether or not the two groups may differ. In addition, the scale differences between the median of the CI and LI enterprises should also be considered during an analysis of the median plots. A narrow gap between the median of the CI and LI for the upswing or decline phase would possibly indicate that the two groups are less likely to differ significantly for the period. Conversely, a wide gap between the medians of the two groups would increase the likelihood that they may differ significantly for a particular (decline) phase in the economic cycle (as in Figure 7.2). The groups of patterns are illustrated in Table 7.1.

Table 7.1 *Graphic representations of different patterns obtained from an analysis of the median of each financial indicator*

Similar patterns	Opposite patterns
Declining 	**Torch shape** 
Declining intersecting 	**Funnel shape** 
Upward 	**Scissors patterns** 

The general possibilities mentioned above are used to determine the extent of the differences between CI and LI enterprises. The analysis indicates six different groups of patterns with several variations occurring within each group. Three groups could be considered as similar patterns and three groups as opposite patterns. "Declining" and "declining intersecting" and "upward" patterns exhibit similar trends, while the "torch"-shaped, "funnel"-shaped and "scissors" patterns exhibit opposite trends for CI and LI enterprises. Each of the primary groups of patterns is assigned a descriptive association. Group one patterns are termed "declining" (both CI and LI decline) and exhibit three variations: D1 (the gap between the medians of CI and LI enterprises is smaller for the upswing and wider for the decline), D2 (the median profile pattern of CI and LI enterprises for both phases are "parallel", but the level may differ) and D3 (the gap between the medians of CI and LI enterprises is larger for the upswing and smaller for the decline). Group two exhibits "declining intersecting" (both CI and LI enterprises decline, but intersect) patterns. Group three patterns are termed "upward" patterns (both CI and LI enterprises show an increase) and exhibit three variations: U1 (the gap between the medians of CI and LI enterprises is smaller for the upswing and wider for the decline), U2 (the median profile pattern of CI and LI enterprises for both phases are "parallel", but the level may differ) and U3 (the gap between the medians of CI and LI enterprises is larger for the upswing and smaller for the decline).

Patterns classified as part of groups four through six are opposite patterns. Group four patterns are "torch"-shaped (CI and LI enterprises indicate opposite declining and upward trends), group five patterns are "funnel"-shaped (CI and LI enterprises indicate opposite declining and upward trends) and group six exhibits "scissors" patterns (CI and LI enterprises indicate opposite declining and upward trends which intersect). Due to the sequence of first an upswing and then a decline period, patterns which intersect each other and indicate upward trends in both CI and LI enterprises are not obtained among the 61 financial performance indicators. The shape of the median pattern may be misleading due to large-scale differences between the CI and LI enterprises for either the upswing or decline phase, or variation in the data for a particular indicator.

An observation of the median patterns indicate that the "declining" and "declining intersecting" patterns account for 39 of the 61 patterns exhibited by the performance indicators, which is expected due to the upswing occurring first followed by the decline phase.

The majority of these ratios occur in the profitability, growth, value and inflation-adjusted categories, while the other groups of patterns occur frequently in the cash flow category of performance indicators. Only 6 of the 61 indicators exhibit an "upward" trend, which could be expected for either or both the CI and LI enterprises for a ratio such as dividend per share. Unexpected upward patterns could also be caused by large-scale differences among the enterprises for a particular ratio.

Visually it would appear that differences between CI and LI enterprises could occur in the decline and upswing period for median patterns that exhibit "torch", "funnel" and "scissors" patterns. Perceived differences could also occur between CI and LI enterprises during the upswing and decline phase with regard to pattern D1 and D3 respectively due to a faster or slower decrease. Pattern D2, which indicates possible "parallelism", could indicate differences between CI and LI enterprises for the upswing and decline phases, or conversely, no differences may occur between the two groups during either the upswing or decline phase. The "upward" patterns may indicate possible differences between CI and LI enterprises during the decline and upward phases for U1 and U3 respectively, while U2 would be assessed in the same manner as D2.

Furthermore, it is anticipated that "torch"-shaped patterns would indicate larger differences between CI and LI enterprises for the decline phase, while the "funnel"-shaped patterns may highlight larger differences between CI and LI enterprises during the upswing phase. In contrast CI and LI enterprises may differ for both the upswing and decline phase if ratios exhibit "scissors" patterns. The median patterns may be deceptive due to the scale and sample variation and should therefore be considered together with non-parametric statistical analysis to determine differences between CI and LI enterprises.

From a financial perspective, it may be anticipated that profitability indicators would exhibit "declining" patterns for both CI and LI enterprises during a decline in the economic cycle. However, it is also possible to expect that CI enterprises may be affected more detrimentally in a period of decline than LI enterprises. The same rationale could be assumed for the growth performance indicators. The differences between cash and income could provide interesting results for CI and LI enterprises for both the decline and upswing phases given the sensitivity of cash flow to movements in the economic cycle. However, it is anticipated that

both CI and LI enterprises should indicate significant downward trends with CI enterprises being more detrimentally affected than LI enterprises due to the nature and scope of their products and services.

It is to be expected that the market may value LI enterprises more favourably in a period of decline than CI enterprises. However, the trend for both CI and LI enterprises should be declining. During an upswing period it is also expected that the earnings trend of CI enterprises may surpass those of LI enterprises causing CI enterprises to outperform LI enterprises. A declining trend from the upswing to the decline period is also anticipated for inflation-adjusted indicators.

Furthermore, it is to be expected that performance indicators such as the return on total net assets, cash flow return on total net assets and inflation-adjusted return on total net assets revalued on the premise of a five-year and ten-year average age respectively should indicate similar results. Similar results are expected for indicators calculated on both a pre- and after-tax basis as well as for inflation-adjusted indicators that assume a revaluation of assets for both a five-year and ten-year average age. The income and cash flow margin ratios and earnings, cash flow and inflation-adjusted per share ratios are also expected to provide similar results.

An analysis of the median plots highlights possible differences between CI and LI enterprises for an upswing and/or decline phase in the economic cycle. The median plots should not be considered in isolation from the notched box and whisker plots (see section 7.6) due to the variation in the data values and the large measurement scales for those variables which have potential outlier data points.

7.4.2 An analysis of the notched box and whisker plots of the median for each financial performance indicator

The notched box and whisker plots of the variables should be considered as complementary illustrations to the median plots discussed and analysed previously (see Figure 7.1). In addition, these plots provide an indication of possible outlier values, a measure of central tendency, skewness and variation as well as an approximate 95% confidence interval for the median. This confidence interval could also be used in an approximate test to determine

whether or not the LI median and the CI median provide statistically significant differences at a 5% significance level. Figure 7.3 provides four notched box and whisker plots for the CI and LI groups of enterprises during the upswing and decline in the economic cycle for return on total net assets (X1). These illustrations of the behaviour of a financial performance indicator are used to distinguish between CI and LI enterprises during each of the two phases of the economic cycle.

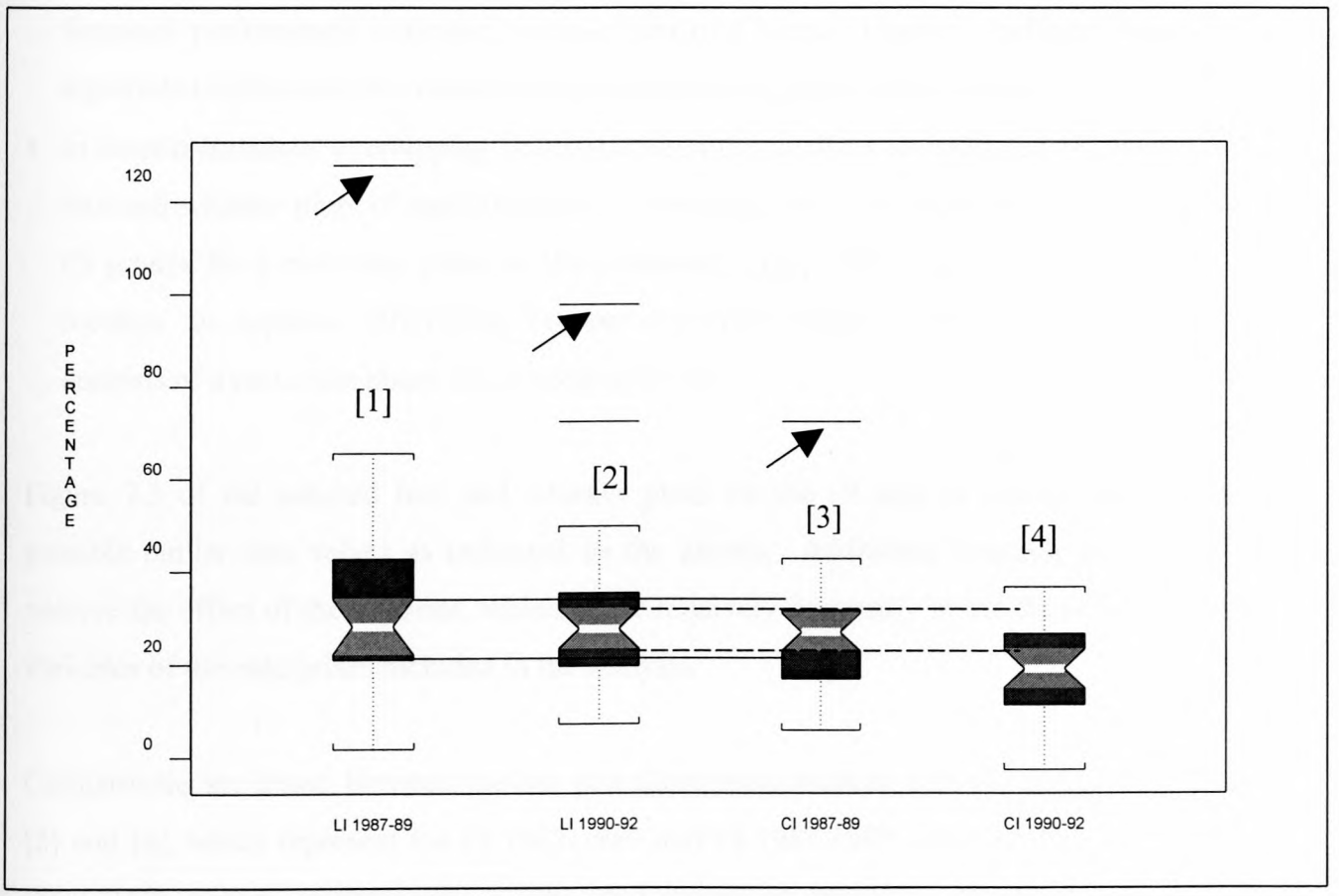


Figure 7.3: Notched box and whisker plots are a graphic representation for return on total net assets (X1)

Several general inferences could be made with regard to the notched box and whisker plot illustrations of the different financial performance indicators:

- Potential outlier data points are present in certain cases, which may affect the distribution of the variable. Although the box part of the plot would indicate a normal size, the scale of the graph makes provision for outlier values. The scale of the graph causes the box part of

the plot to narrow, thereby hindering the identification of possible differences between CI and LI enterprises. This problem further complicates the analysis, as indicators that may indicate differences between the two groups are not identified from the notched box and whisker plots. Additional research is therefore required to determine the significance of these data points in order to enhance the analysis.

- If the notches of the two boxes do not overlap, this indicates a difference in location (the median) at a rough 5% significance level (S-PLUS, 1997). This implies that for a particular financial performance indicator, the medians of CI and LI groups indicate statistically significant differences from each other for a particular phase in the economic cycle.
- In certain instances overlapping occurs between the medians as indicated by the notched box and whisker plots of each financial performance indicator associated with the LI and CI groups for a particular phase in the economic cycle. This implies that with regard to location no apparent differences between or within groups are recognisable from the analysis of a particular phase in the economic cycle.

Figure 7.3 of the notched box and whisker plots for the CI and LI enterprises indicates possible outlier data values as indicated by the arrows. Additional research is required to analyse the effect of these points, which occur relatively frequently in the financial indicator variables of the enterprises included in the analysis.

Comparisons are drawn between the box plot illustrations marked with [1] and [3] as well as [2] and [4], which represent the LI 1987-1989 and CI 1987-1989; and LI 1990-1992 and CI 1990-1992 periods respectively. The deductions of possible statistically significant differences between CI and LI enterprises are determined by comparing the notches (as indicated by the solid and dashed line) in the figure of the box and whisker plots for the two groups over the same phase of the economic cycle. If the notches, which represent a 95% confidence interval of the median of the data points, overlap or correspond, it is possible to deduce that with regard to location no statistically significant difference exists between CI and LI enterprises for the upswing period in the economic cycle. In this instance the LI and CI enterprises do not "react" differently in a statistically significant manner to the behaviour of ratio XI during an upswing period in the economic cycle.

The decline phase requires comparisons of the notched box and whisker plots marked with a [2] and [4]. A comparison of the notches as highlighted by the dash line indicate that no overlapping occurs between the notches and it is therefore possible to conclude that with regard to location CI and LI enterprises indicate statistically significant differences during the decline period. The return on total net assets indicates differences between CI and LI enterprises, which are statistically significant during a decline period. This inference is also supported by the initial indication of a possible difference highlighted by the analysis of the median plot. Although not part of the current analysis, it is also possible to compare the notched box and whisker plots marked [3] and [4] that represent CI enterprises during the upswing and decline phase. It is also clear from Figure 7.3 that the CI enterprises differ for the upswing and decline phase, although only marginally. The same approach was followed to analyse each of the financial performance indicators included in the study.

7.5 Results of the EDA

7.5.1 Nature and scope of the patterns exhibited by the median of each group of financial performance indicators

The illustration and analysis of the median plots discussed above enable each median pattern within each group to be assigned to a financial performance indicator. The results are indicated in Table 7.2 and are discussed in the context of the primary groups of financial performance indicators.

An important finding of this analysis confirms the necessity to interpret these results in the context of the following aspects. Firstly, CI and LI enterprises may not react immediately nor simultaneously to an upswing or decline in the economic cycle. In other words, the period of the lag (if any) may differ between the groups of enterprises. Secondly, both the upswing and decline period lasted three years. Should the values for each of the three years differ substantially during the upswing or decline phase, a median pattern may be obtained which is contrary to what is expected due to the use of average values. Thirdly, the behaviour of the enterprise or, alternatively, the manner in which the enterprise reacts to an upswing or decline phase is not necessarily considered in the same context as the reaction of the economy to a decrease or increase in levels of production. For instance, an enterprise may continue to follow its dividend policy, which may be to increase dividends by the inflation rate each year.

This will account for an upward pattern in the dividend per share. Fourthly, the shape of the median pattern may be misleading due to the scale of the graph so that in essence the anticipated difference exhibited by the plot is actually negligible. However, the statistical analyses described in section 7.5.2 and the results presented in section 7.9.2 would indicate which of these differences are statistically significant.

Table 7.2: Distinguishable patterns of the median applicable to financial performance indicators

Traditional profitability financial performance indicators															
Indicator	X1	X1A	X2	X2A	X3	X3A	X4	X4A	X5	X5A	X6	X7	X8	X9	X10
Pattern*	D1	D2	2	D2	D2	D3	D2	D2	D3	D2	D3	5	5	U2	U3
Status**	LI	LI	N/A	LI	LI	LI	LI	LI	CI	CI	CI	N/A	N/A	CI	LI

Traditional growth financial performance indicators									
Indicator	X11	X12	X13	X14	X15	X16	X17	X18	X19
Pattern*	D2	D2	2	2	5	D3	D1	D3	-----
Status**	LI	LI	N/A	N/A	N/A	LI	LI	LI	-----

Cash flow financial performance indicators																			
Indicator	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29	X30	X31	X32	X33	X34	X35	X36	X37	X38
Pattern*	6	6	D1	U2	D3	5	5	4	D3	D1	6	6	D2	5	U2	4	4	5	U2
Status**	LI	CI	LI	CI	LI	LI	CI	N/A	CI	CI	LI	LI	CI	N/A	CI	N/A	N/A	CI	CI

Value-related financial performance indicators									
Indicator	X39	X40	X41	X42	X43	X44	X45	X46	X47
Pattern*	D1	D2	4	D2	D2	D3	D3	D1	D3
Status**	LI	CI	N/A	LI	LI	N/A	N/A	N/A	LI

Inflation-adjusted financial performance indicators										
Indicator	X48	X48b	X49	X49b	X50	X50b	X51	X52	X53	X54
Pattern*	4	D2	D1	D2	D1	D2	D2	D2	U1	D1
Status**	N/A	LI	LI	LI	LI	LI	CI	CI	CI	CI

*** Key for patterns:**
1 = "Declining" patterns; where D1, D2, D3 are variations of patterns that occur in the declining group
2 = "Declining intersecting" patterns
3 = "Upward" patterns; where U1, U2, U3 are variations of patterns that occur in the upward group
4 = "Torch"-shaped patterns 5 = "Funnel"-shaped patterns 6 = "Scissors"-shaped patterns

** The notation LI implies that the median of the LI enterprises is higher than that of the CI enterprises during both the upswing and the decline period. CI implies a higher value for CI enterprises during both periods.

N/A Refers to a torch, funnel or scissors pattern where either the CI or LI enterprises indicate opposite patterns from the upswing to the decline phase.

The results suggest that the majority of the indicators exhibit similar patterns. Only 16 of the 61 ratios highlight opposite patterns. Opposite patterns are numbered 4, 5 and 6 in Table 7.2. Ratios that exhibit similar patterns number 45, of which 21 ratios suggest differences of degrees. The latter include the D1, D3, U1 and U3 ratio patterns. Those ratios that exhibit differences of degrees together with the opposite patterns comprise 37 of the total number of indicators used during the research. A visual analysis of the median ratio patterns suggests that the remaining 24 ratios may not be expected to indicate differences between the CI and LI enterprises during either or both the upswing and decline phases. However, the level of the CI and LI enterprises may differ, which could also indicate differences between the two groups for ratios that appear to be similar. Perusal of the median ratio patterns suggests that a large number of indicators may indicate differences between the CI and LI enterprises.

The opposite patterns would appear to suggest the most likely possibility to obtain differences between CI and LI enterprises. It may be expected that the "torch"-shaped patterns would indicate differences between the CI and LI enterprises during the decline period, while the "funnel"-shaped patterns may suggest differences between CI and LI enterprises during the upswing phase. The "scissors" patterns may suggest differences between CI and LI enterprises during both the upswing and decline phases. Therefore, these patterns should initially become the focus of the analysis in order to determine whether or not statistically significant differences are obtained between the CI and LI enterprises.

The following group of patterns that may suggest differences between CI and LI enterprises are those that are similar, but highlight differences of degrees during the upswing or the decline phase. The possible differences would depend on the type of declining or upward pattern. It is not expected that the remaining similar patterns would indicate any differences between CI and LI enterprises. However, the graphic illustration of the median patterns could be misleading.

The relevance of the differences of degree patterns is emphasised by the large number of ratios that exhibit these patterns. The majority of the profitability, growth, value and inflation-adjusted ratios indicate declining patterns with differences of degrees, while the cash flow group generally exhibits the opposite patterns. It is not possible to draw any significant conclusions at this stage on the basis of the ratio patterns, except to indicate that ratios which

indicate declining patterns are expected for the ratios which indicate overall similar patterns. Further analysis is required to support the suggestions of statistically significant differences between CI and LI enterprises as indicate above.

7.5.2 Use of notched box and whisker plots to identify statistically significant differences between CI and LI enterprises

The notched box and whisker plots together with the median plots are also used to identify the financial performance indicators which indicate differences between CI and LI enterprises for either the upswing or the decline period in the economic cycle, or for both. Each financial performance indicator is interpreted using the notched box and whisker plots in the same manner as discussed previously. Table 7.3 highlights several financial performance indicators which appear to indicate statistically significant differences between CI and LI enterprises for either the upswing or the decline period, or both.

Table 7.3 Provisional statistically significant differences of location between CI and LI enterprises for an upswing and decline phase in the economic cycle for the financial performance ratios as indicated by the notched box and whisker plots

Financial performance group	Financial performance indicator*	Economic Upswing (1987-1989)	Economic Decline (1990-1992)	Median Pattern	Status
Traditional: profitability	X1	✗	✓	Declining 2	LI
	X9	✓	✓	Upward 2	CI
Cash flow	X26	✓	✓	Funnel	N/A
	X33	✓	✓	Funnel	N/A
	X34	✓	✗	Upward 2	CI
	X36	✓	✓	Torch	N/A
Value	X41	✗	✓	Torch	N/A
Inflation-adjusted	X48	✗	✓	Torch	N/A
	X48b	✓	✓	Declining 2	LI

✓ Suggests statistically significant differences (5% significance level) for the financial performance indicator between CI and LI during a specific phase of the economic cycle

✗ Highlights no apparent statistically significant differences for the financial performance indicator between CI and LI enterprises during a specific phase of the economic cycle

* See Appendix 6D of Chapter 6 for a broad title description of each ratio indicated in the above table.

N/A Indicates that CI enterprises do not have higher median values than the LI enterprises, but some form of intersection between the patterns of the two groups occurs. The converse also applies.

The initial analysis isolates nine financial performance indicators which suggest statistically significant differences between CI and LI enterprises for either the upswing or decline or both periods of the economic cycle. In addition, five of the nine performance indicators highlight differences between CI and LI enterprises in both phases of the economic cycle, while three of the remaining four indicate no statistically significant difference during the upswing phase. Of the indicators that highlight differences, four represent the cash flow category, two are classified as traditional profitability indicators, two as inflation-adjusted indicators and one a single value indicator. The type of median pattern for each variable is also indicated in Table 7.3. A visual analysis of the median patterns exhibited by the torch, funnel and scissors groups may suggest statistically significant differences for either the upswing or decline period or both. The results, however, indicate that five of the nine indicators exhibit "torch"-shape or "funnel"-shape patterns. "Scissors" patterns are not represented among those indicators that highlight statistically significant differences for either the upswing or decline period, or both. Median patterns in the "declining", "declining intersecting" and "upward" pattern groups are also represented in the cash flow, profitability and inflation-adjusted categories of financial performance indicators.

The results appear to be indicative of the manner in which the financial performance indicators are calculated. For instance, performance indicator X1 highlights differences between CI and LI enterprises for the decline period, while variable X1A (after-tax calculation) illustrates no statistically significant differences between the two groups of enterprises for either the upswing or the decline phase in the economic cycle. Although X1 and X1A exhibit very similar median patterns, it is possible to conclude that the difference occurs as a result of the statistical significance level and that it is possible that the two indicators indicate very similar results.

Financial performance indicators X48 (real return on total net assets before tax) and X48b differ in terms of the average age of land and buildings. In the case of X48 the average age of land and buildings for the revaluation is considered to be five years, while the land and buildings in X48b have an average age of 10 years. It would appear that the age of the land and buildings has an impact on whether or not statistically significant differences occur between CI and LI enterprises. For instance, the behaviour of financial performance ratio X48 indicates that CI and LI enterprises do not highlight statistically significant differences during

the upswing phase, while statistically significance differences occur between the two groups for financial performance indicator X48b. Both indicators highlight statistically significant differences between CI and LI enterprises for the decline phase in the economic cycle.

This sub-section considered the statistical significance of differences between CI and LI enterprises for either the upswing or decline phase or both on the basis of the notched box and whisker plots. Several such differences were discussed. However, the analysis was constrained by the presence of outlier values which is incorporated by the scale of the graph. As a consequence the box part of the plot narrows, although the size of the box part of the plot does not change, thereby hindering any possible identification of differences between CI and LI enterprises.

A comparison of the suggested differences between CI and LI enterprises based on the median patterns and highlighted in section 7.5.2, and the ratios which highlight statistically significant differences for the CI and LI enterprises in the previous section indicated the following:

- Five of the opposite patterns (three cash flow, one value and one inflation-adjusted ratio) that were expected to indicate statistically significant differences between CI and LI enterprises form part of the group of ratios that suggest statistically significant differences.

- The remaining four median patterns (two profitability, one cash flow and one inflation-adjusted ratio) indicate statistically significant differences between the CI and LI enterprises which were not expected as indicated previously. The substantially higher level of the ratio for one group over the other appears to cause these statistically significant differences in either or both the upswing and decline phases. These differences are therefore relevant for enhancing forecasts, given the perceived stability of the pattern.

7.6 Non-parametric analysis of the median profiles

Non-parametric techniques, and for those ratios satisfying the necessary assumptions, parametric procedures such as mean profile analysis based on Hotelling's T^2 statistics, are also used to supplement the results obtained from the EDA analysis conducted in the first part of the chapter. The Mann-Whitney U-test and Wilcoxon matched-pairs test are used to

determine statistically significant differences between the CI and LI enterprises during the upswing and decline phases and differences between the phases for the CI and LI enterprises respectively. A further two ratios (X27 and X31) are also excluded at this stage due to a low number of valid data points. The analysis conducted in this section consists of 59 ratios.

It is possible to identify four situations where comparisons are possible between CI and LI enterprises and for either the CI or LI group for the upswing and decline phases of the economic cycle. These comparative situations as identified from the median plot (see Figure 7.2) are indicated in Table 7.4.

Table 7.4: Comparative situations for CI and LI enterprises during the upswing and decline phases

Case	Task	Reference to Figure 7.2
Case 1	Compare CI and LI during the upswing	[1] and [2]
Case 2	Compare CI and LI during the decline	[3] and [4]
Case 3	Compare upswing and decline for CI enterprises	[1] and [3]
Case 4	Compare upswing and decline for LI enterprises	[2] and [4]

A hypothesis test is used to determine whether or not statistically significant differences occur in the above-mentioned cases. The independence or dependence of the samples often determines the type of hypothesis test used to test for statistically significant differences. In cases one and two in Table 7.4 the CI and LI groups are considered as independent groups, i.e. the CI and LI groups are compared. The Mann-Whitney U-test is a non-parametric test (no distribution is assumed or required to conduct the test) and is appropriate to use when two independent and randomly selected sets of sample observations are at least ordinal, i.e. arranged from low to high or conversely from high to low (Mason, 1978: 355). Mason (1978: 356) also indicates that the express purpose of the Mann-Whitney U-test is to determine whether or not the two independent samples come from the same population. A large sample consists of more than 20 observations, while conversely a small sample has 20 or fewer observations.

Cases three and four in Table 7.4 consider the upswing and decline phases as dependent or related for either the CI or LI enterprises. The Wilcoxon matched-pairs test is also a non-

parametric statistical test and is appropriate to apply if the nature of the data is ordinal and the two samples are related (Mason, 1978: 365). An added attraction of the test is guaranteed validity, which implies that an actual significance level will not exceed the pre-assigned level for a large class of non-identical distribution situations (Koopmans, 1981: 321). The null hypothesis states that the median of the sums of the positive and negative ranks is not different from zero. This implies that should the sum of the positive and negative ranks not depart significantly from zero, the difference could be explained by the sampling variation.

The following is a synopsis of the stated hypotheses for the different cases mentioned in Table 7.4.

Cases 1 and 2	**Cases 3 and 4**
CI and LI samples: Independent	Upswing and decline phases: Related
Nature of hypothesis test: Non-parametric	Nature of the hypothesis test: Non-parametric
Type of hypothesis test:	Type of hypothesis test:
Mann-Whitney U-test	Wilcoxon matched-pairs test
Case 1: H_o: $Me_{CI\text{-}upswing} = Me_{LI\text{-}upswing}$	Case 3: H_o: $Me_{CI\text{-}upswing} = Me_{CI\text{-}decline}$
Case 2: H_o: $Me_{CI\text{-}decline} = Me_{LI\text{-}decline}$	Case 4: H_o: $Me_{LI\text{-}upswing} = Me_{LI\text{-}decline}$

Both hypothesis tests are applied at a 5% significance level. If a p-value of less than 0,05 is obtained it may be concluded that the CI and LI enterprises would differ in cases one and two. A similar explanation applies to cases three and four. A probability of larger than 0,05 would indicate no statistically significant differences for each of the above-mentioned cases.

The results of the non-parametric hypothesis tests described above are presented in section 7.9.2 together with a discussion of possible reasons for the findings from a financial management perspective.

7.7 Comparisons of the mean and median profile patterns

The mean profiles similar to the median profiles indicated in Figure 7.2 are compiled for each of the ratios. Figure 7.4 is an example of a mean profile for return on total net assets (X1). The following distinguishing characteristics are evident from the mean profile: the means for

both the CI and LI groups decline from the upswing to the decline phase, which is to be expected, while a steeper decline for CI enterprises is apparent from the profile. The mean of the LI enterprises is higher than for the CI enterprises during both the upswing and decline period. One should take cognisance of the sensitivity of the mean to outliers and as a result scale differences which exist between the median and mean plots should be carefully considered when comparisons are made.

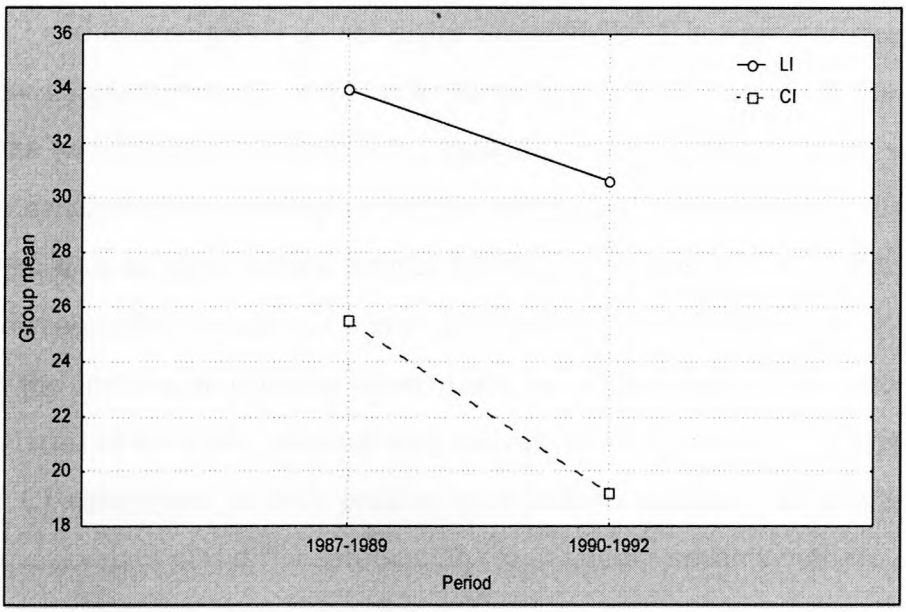


Figure 7.4: A plot of the mean profile return on total net assets (X1) for the CI and LI group of enterprises for 1987-1989 and 1990-1992

The mean profile of each ratio is compared to its corresponding median profile. From a visual comparative analysis of the two profiles, it is possible to determine situations where the mean and median profiles exhibit similar patterns and conversely different patterns. Different patterns in this context refer to situations where, for example, a median profile for a ratio indicates an upward pattern for CI enterprises, while the mean profile indicates a declining pattern for the same CI group of enterprises. Those median and mean profiles that appear to be similar and do not indicate scale differences could be considered as having an approximate normal distribution. Conversely, those mean and median profiles that appear to differ may indicate the presence of outlier values. It is, however, also important to consider the variation in the data and the scale differences when comparisons are made between the mean and median profiles. These outliers may occur due to various internal and external occurrences, which makes it possible that a particular financial performance indicator may exhibit an

unusually high or low (extreme) value for a particular year. As a result, the range may give a distorted portrayal of the actual distribution of the variable.

Figure 7.5 highlights the median and mean profile for two financial indicators, return on total net assets (X1) and Tobin's Q-ratio (X41). The representation illustrates two situations; firstly, where the median and mean profiles are similar (X1) and secondly, where the median and mean profiles are different (X41). It is clear from the median and mean profiles for ratio X1 that the CI and LI enterprises do not differ substantially. The apparent steeper decline in the median for CI enterprises if compared to the mean is mainly caused by the differences in the scale of the two graphs. (In section 7.9.2 these differences are investigated statistically.) It is possible to conclude that a comparison of the median and mean profiles indicates no major differences and thus an approximate normal distribution is assumed. In contrast to X1, the median and mean profiles compiled for ratio X41 indicate opposite patterns for the CI median and mean for the upswing and decline phase, while the median and mean for the LI enterprises also differ in terms of the scale, although they indicate upward patterns. The opposite patterns obtained for CI enterprises in both profiles may indicate outliers. In addition, the group median and mean values also differ substantially, highlighting possible outliers.

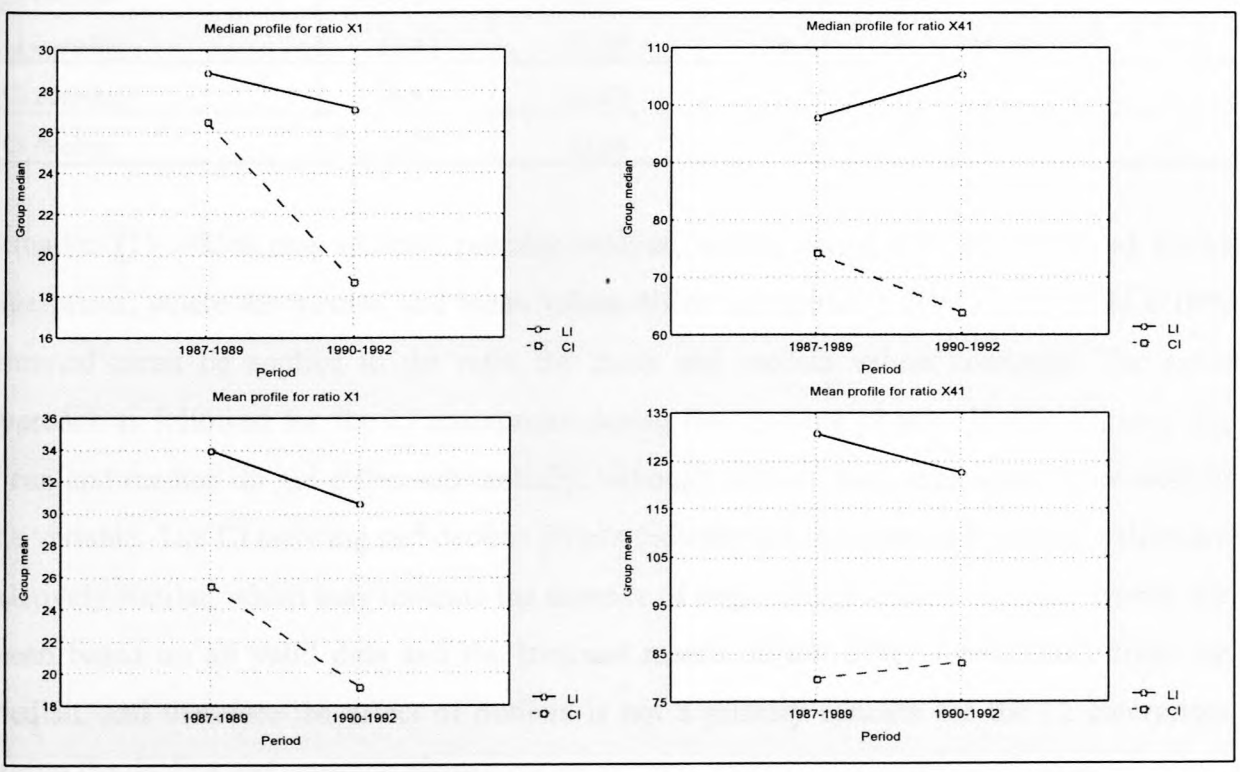


Figure 7.5: An illustration of similar (return on total net assets (X1)) and different (Tobin's Q-ratio (X41)) mean and median profiles

In order to complement the analysis of the mean and median profiles, the mean was readjusted or trimmed at a level of 5% and 10%. The trimmed means are calculated for the LI upswing phase, LI decline phase, CI upswing phase, and CI decline phase. "Trimming" implies that the upper and lower 5% of the data points are removed and a "trimmed" mean is calculated on the decreased number of data points. The same procedure is applied when determining the trimmed 10% mean. The procedure of trimming should effectively discard large outlier values present in each of the ratios. A comparison of the median, mean (basis all valid data) and trimmed 5% and 10% means could assist with the detection of possible outliers among either or both the CI and LI enterprises for a particular ratio. The following example is an illustration of the effect of outlier values on the distribution for the cash flow to net operating assets (X21). The results for ratio X21 are presented in Table 7.5.

Table 7.5: A comparison of the median, mean and trimmed means for CI and LI enterprises during the upswing and decline phases of the economic cycle for cash flow to net operating assets (X21)

Cash flow to net operating assets (X21)	Median	Mean (all valid data)	Trimmed mean (5%)	Trimmed mean (10%)	Situation
LI decline	34,07	62,75	44,09	31,49	1
LI upswing	21,42	29,09	26,41	24,15	2
CI upswing	26,91	23,43	24,15	25,09	3
CI decline	21,50	22,60	22,65	22,36	4

Situation (1), which may indicate possible outliers, occurs during the decline period for LI enterprises, where the median and mean values differ substantially. However, should a 10% trimmed mean be applied to the ratio the mean and median values converge. The same approach is followed for the LI enterprises during the upswing phase. In this instance the mean and median do not differ substantially, although outliers may once again be present in the variable. The CI upswing and decline phases indicate that the mean and median values are relatively similar, which may indicate the absence of large outlier values. In other words, the mean based on all valid data and the trimmed means do not differ substantially from the median, and therefore the effect of outliers is not a primary concern for the CI enterprises during the decline and upswing phases.

The following example for return on ordinary shareholders' interest (X3) illustrates a situation which requires adjustments to the mean of the LI enterprises during the upswing and decline phases in order to ensure similar median and mean profiles. No adjustments are necessary for the CI enterprises during the upswing or decline phases. The results of the "trimming" are indicated in Table 7.6.

Table 7.6: Adjustments made to the mean of return on ordinary shareholders' interest (X3)

Group and phase in the economic cycle	Median value	Adjustment if required*	Mean/adjusted mean value
LI upswing	33,67	10% trimmed mean	33,98
LI decline	23,48	5% trimmed mean	25,64
CI upswing	29,17	Mean based on all valid data	28,72
CI decline	19,33	Mean based on all valid data	19,30

* The type of adjustment to the mean was selected on the basis of the option which provided the nearest value to the median value

A comparison of the median and mean profiles together with the trimmed mean indicates several possible situations:

1. The mean and median profiles are similar (for example, ratio X1).
2. A 5% trimmed mean for an individual period (e.g. LI upswing) or multiple periods (e.g. LI decline and CI upswing) would provide a similar pattern (for example, ratio X22) than the median.
3. A 10% trimmed mean for an individual period (e.g. LI upswing) or multiple periods (e.g. LI decline and CI upswing) would provide a similar pattern (for example, X54) than the median.
4. A 10% trimmed mean for an individual period (e.g. LI upswing) or multiple periods (e.g. LI decline and CI upswing) still indicates large differences between the mean and median values (for example, X32).

7.8 Analysis of the mean profile

An analysis of the CI and LI enterprise group mean profiles is provided in this section. The analytical techniques used in this section are only applicable to ratios which do not indicate

significant deviations from normality, hence the need to compare the mean and median profiles and use the mean and trimmed means to highlight the presence of outlier values as well as to eliminate the influence of these such values. In the case of multivariate normality, the ordinary Hotelling's T^2 test can be used to test for differences between the mean vectors of the CI and LI enterprises. However, since these mean vectors can be represented as two profiles, a more detailed analysis can be conducted using a profile analysis based on Hotelling's T^2 test.

Hotelling's T^2 test for two independent groups is used to determine if there is a statistically significant difference between the centroids of the two groups, i.e. between the means of the two groups for several variables simultaneously (Tacq, 1997: 238, 248). With reference to this study, Hotelling's T^2 test aims to determine whether or not statistically significant differences occur between CI and LI enterprises when the individual upswing and decline phases of the economic cycle are considered for each group.

A two-group profile analysis is relevant to those situations where a series of p treatments (tests) are administered to two groups of subjects and the means of these p treatments can be represented as a profile for each group. It is assumed that the responses for the different groups are independent of one another (Morrison, 1976: 153-155). The question arises whether or not the mean vectors for the CI and LI groups are similar. For the purposes of this study the following situation applies, where μ represents the mean of the population.

In this context μ_1 represents $[\mu_{\text{LI upswing}}, \mu_{\text{LI decline}}]$ and μ_2 represents $[\mu_{\text{CI upswing}}, \mu_{\text{CI decline}}]$. The vector μ_1 is the mean response vector of the LI enterprises for the upswing and decline phases of a particular financial indicator, while μ_2 is the mean response vector of the CI enterprises for the upswing and decline phases of a particular financial indicator.

The hypothesis H_o: $\mu_1=\mu_2$, against an alternative H_a: $\mu_1\neq\mu_2$, which can be tested by Hotelling's T^2 test, where

$$\mu_1 = \begin{bmatrix} \mu_{LI,\ upswing} \\ \mu_{LI,\ decline} \end{bmatrix}$$

$$\mu_2 = \begin{bmatrix} \mu_{CI,\ upswing} \\ \mu_{CI,\ decline} \end{bmatrix}$$

implies that the upswing and decline phases have the same effect on the CI and LI enterprises, for a particular ratio.

The profile analysis of the profile means for the CI and LI enterprises suggests that for a given set of mean profiles it is possible to state three questions regarding the population profiles underlying the sample data (Morrison, 1976: 153-154). Each question is briefly considered and elaborated upon with the aid of a diagrammatic representation.

1. Are the population mean profiles similar, in the sense that the CI and LI profiles are parallel? The null hypothesis states that the CI and LI mean profiles are parallel as opposed to an alternative that the CI and LI mean profiles are not parallel. The hypotheses could also be stated as follows:

   H_{01}: $\mu_{LI\ upswing} - \mu_{LI\ decline} = \mu_{CI\ upswing} - \mu_{CI\ decline}$

   H_{a1}: $\mu_{LI\ upswing} - \mu_{LI\ decline} \neq \mu_{CI\ upswing} - \mu_{CI\ decline}$

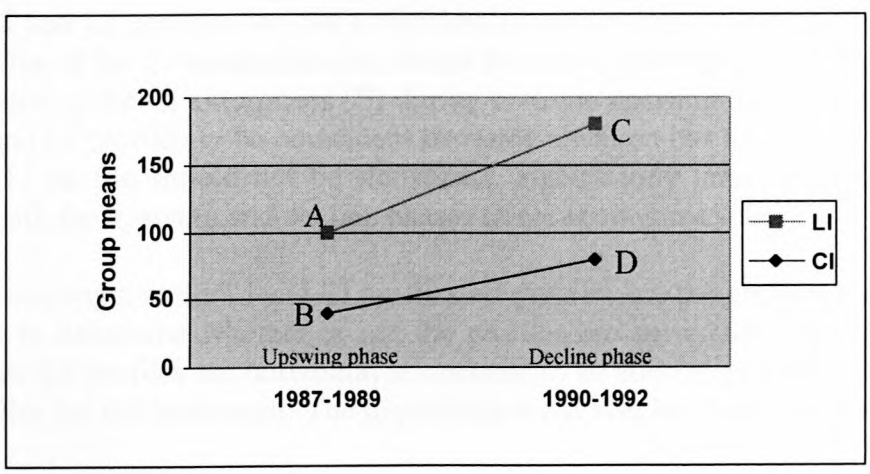


Figure 7.6: A graphic representation of the mean profiles for the CI and LI enterprises for the upswing and decline phases to determine whether or not the CI and LI profiles are parallel

The CI and LI profiles exhibited in Figure 7.6 are parallel if the slope of the line joining A and C is equal to the slope of the line joining B and D. Acceptance of parallelism is a prerequisite for testing the next two hypotheses.

2. If the two population profiles are indeed parallel, are they also coincident?
In order to determine if the profiles are coincident or not, the null hypothesis states that the LI and CI profiles are coincident as opposed to an alternative that the LI and CI profiles are not coincident. The hypotheses are stated as follows:

H_{02}: $\mu_{LI\ upswing} = \mu_{CI\ upswing}$ and $\mu_{LI\ decline} = \mu_{CI\ decline}$

H_{a2}: $\mu_{LI\ upswing} \neq \mu_{CI\ upswing}$ and $\mu_{LI\ decline} \neq \mu_{CI\ decline}$

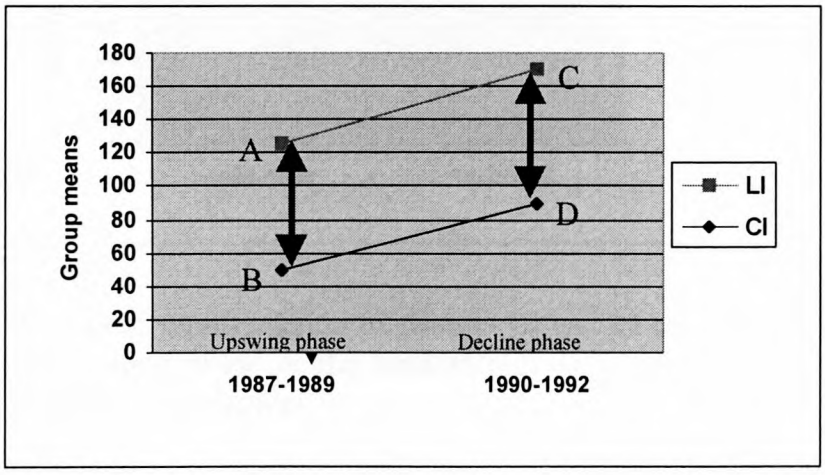


Figure 7.7: A graphic representation of parallel CI and LI profiles for a particular ratio required to determine if the profiles are coincident

If the LI and CI profiles are not coincident (consider the exhibit in Figure 7.7), the mean value of the LI enterprises (A) would be statistically significantly larger than the mean value of the CI enterprises (B) during both the upswing and decline phases. For the CI and LI profiles to be coincident the same situation has to apply to both phases, i.e. the LI profile should not be statistically significantly larger than the CI profile during both the upswing and decline phases of the economic cycle.

3. Again assuming that the LI and CI profiles are parallel, are the profiles horizontal?
In order to determine whether or not the profiles are horizontal, the null hypothesis states that the profiles are horizontal as opposed to an alternative hypothesis that states the profiles are not horizontal. The hypothesis could also be stated as follows:

H_{03}: $\mu_{LI\ upswing} = \mu_{LI\ decline}$ and $\mu_{CI\ upswing} = \mu_{CI\ decline}$

Ha_3: $\mu_{LI\ upswing} \neq \mu_{LI\ decline}$ and $\mu_{CI\ upswing} \neq \mu_{CI\ decline}$

In order to determine if the individual profiles are horizontal or not (as presented in Figure 7.8), the mean during the upswing phase would be compared to the mean during the decline phase where the respective means are based on the CI and LI enterprises together. If the null hypothesis is rejected, the profiles of the CI or LI enterprises, which are considered to be parallel are not horizontal. Hence, the means of the upswing and decline phases are then statistically significantly different.

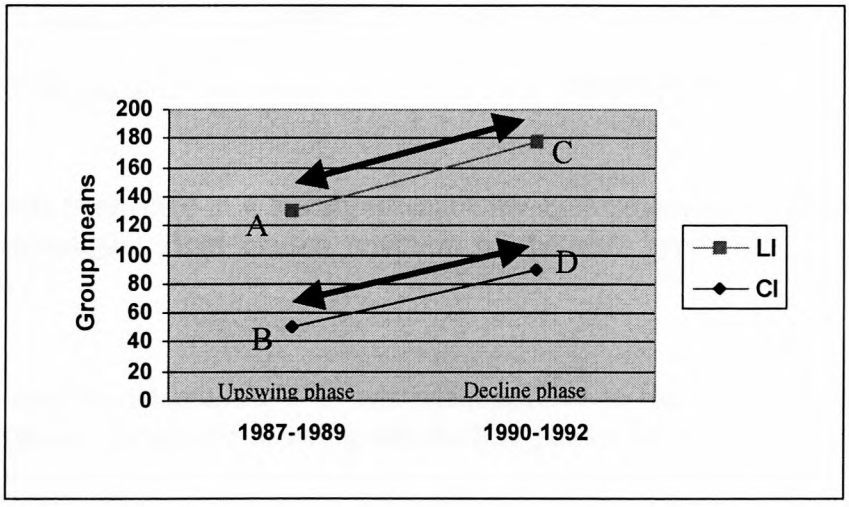


Figure 7.8: A graphic representation of parallel CI and LI profiles for the upswing and decline phase of the economic cycle required to determine if the profiles are horizontal

Both the use of the ordinary Hotelling's T^2 test and profile analysis are discussed with the aid of the return on sales before tax (X5) ratio. Figure 7.9 illustrates the mean profile for the return on sales before tax (X5) for the CI and LI enterprises.

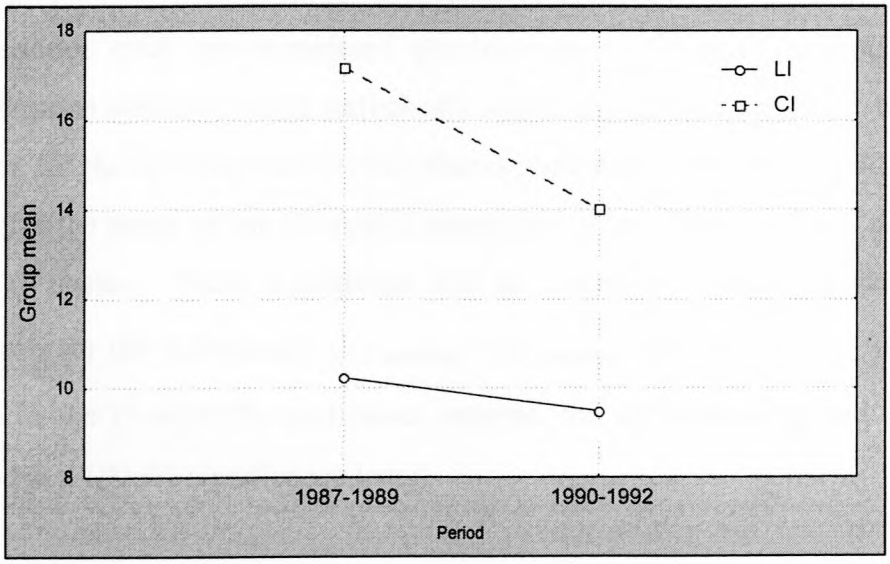


Figure 7.9: A plot of the mean profile for return on sales before tax (X5) for the CI and LI enterprises for 1987-1989 and 1990-1992

Hotelling's T^2 test would be used to test the following hypothesis for return on sales (X5):

H_o: $\begin{cases} \mu_{CI\ upswing} = \mu_{LI\ upswing} \\ \mu_{CI\ decline} = \mu_{LI\ decline} \end{cases}$ versus H_a At least one of the two equalities does not hold.

If the null hypothesis is rejected at a 5% significance level, simultaneous confidence intervals can be used to investigate what causes rejection of the null hypothesis. The results are indicated in Table 7.7.

Table 7.7: The results of Hotelling's T^2 test when applied to the means of the CI and LI enterprises during the upswing and decline phases for return on sales before tax (X5)

Hypothesis	T^2 statistic	p-value
H_o: Mean values of the CI and LI enterprises during the upswing phase are the same during the decline phase. H_a: Mean values of the CI and LI enterprises during the upswing and/or during the decline phase are not the same.	5,70211	0,00582215*

* Significant at 1% level

The results for return on sales before tax highlighted in Table 7.7 indicate that a statistically significant difference exists between the CI and LI enterprises when the upswing and decline phase of the economic cycle are considered simultaneously. An analysis should now be conducted to determine whether or not statistically significant differences occur between LI and CI enterprises for the upswing and decline phases separately. The null hypothesis states that in this instance the mean of the CI and LI enterprises is not different from zero for the upswing (decline) phase. These hypotheses can be tested by evaluating simultaneous confidence intervals for the differences: $\mu_{CI\ upswing} - \mu_{LI\ upswing}$ and $\mu_{CI\ decline} - \mu_{LI\ decline}$. If zero is included in the $(1-\alpha)100\%$ confidence interval, the corresponding null hypothesis cannot be rejected at a $100\alpha\%$ significance level.

Table 7.8 indicates the 95% simultaneous confidence intervals for the CI and LI enterprises for the return on sales before tax (X5) during the upswing and decline phases.

Table 7.8: The results of Hotelling's T^2 test when simultaneous 95% confidence intervals are evaluated for return on sales before tax (X5)

Variable		Lower limit	Upper limit
1	Compare CI and LI enterprises during the upswing phase	–12,70525	–1,8367500
2	Compare CI and LI enterprises during the decline phase	–10,25293	0,5285879

Consider the upper and lower limits of variable 1 at the 95% confidence level, which compares the LI and CI profiles for the upswing phase (see Table 7.8). Should zero fall within the upper and lower limits, no statistically significant difference occurs between CI and LI profiles for the upswing phase. It is clear that this is not the case and therefore it is apparent that the mean of the CI and LI enterprises are statistically different (at the 5% significance level) for the two groups during the upswing phase. In contrast, variable 2 indicates that zero occurs within the upper and lower limits, i.e. a comparison between CI and LI enterprises for the decline phase (see Table 7.8). Consequently, it is possible to suggest that a statistically significant difference between the CI and LI profiles does not occur during the decline phase.

The results for return on sales before tax (X5) obtained from the analysis of the CI and LI profiles discussed previously are indicated in Table 7.9.

Table 7.9: Analysis of the CI and LI mean profiles for return on sales before tax (X5)

Hypothesis	Statistic	p-value
1. Are the CI and LI profiles parallel? H_{01}: Profiles are parallel H_{a1}: Profiles are not parallel	2,181198	0,1457366*
2. If the profiles are parallel, are they coincident? H_{02}: The profiles are coincident H_{a2}: The profiles are not coincident	3,09009	0,003210716**
3. If the profiles are parallel, are they horizontal? H_{03}: The profiles are horizontal H_{a3}: The profiles are not horizontal	7,160543	0,009943016**

* Not significant at 5% level; ** Significant at 1% level

The analysis of the mean profile for return on sales before tax (X5) indicates that the CI and LI profiles are parallel. Furthermore, the profiles are not coincident, which implies that means of the LI profile are statistically significantly larger than the CI profile over both the upswing and decline phases. The results also suggest that the CI and LI profiles are not horizontal and therefore the CI and LI enterprises during the upswing phase differ from the CI and LI enterprises during the decline phase.

The following sections highlight the results of the statistical tests discussed in the preceding sections. The results of the Mann-Whitney U-test and Wilcoxon matched-pairs tests conducted for those ratios that do not exhibit approximate normal distributions are discussed in the following section, followed by the profile analysis results based on Hotelling's T^2 test for those ratios that exhibit approximately normal distributions.

7.9 Results of the statistical hypothesis tests

Prior to applying the hypothesis tests to the ratios, it is necessary to determine the relevance of the hypothesis tests for each of the ratios. The following section highlights the results from a comparison of the mean and median patterns, which are used to identify ratios that have possible outliers and those where outlier values appear to be less influential.

7.9.1 Results from a comparison of the median and mean profiles

A comparison of the median and mean profiles is used together with the mean and trimmed means to identify ratios which have possible outlier values. Each indicator is analysed on an individual basis and can be categorised as having similar or different median and mean profiles. Those ratios that exhibit similar median and mean profiles would appear not to deviate substantially from an approximate normal distribution. A total of 26 of the 59 ratios included in this section of the analysis indicate similar median and mean profiles. The majority of the indicators in the profitability category and inflation-adjusted category appear to have similar median and mean profiles.

The 33 ratios that indicate different profiles suggest opposite median and mean patterns for either or both the CI and LI enterprises. These ratios are also analysed together with the 5% and 10% trimmed mean. This is done to provide more conclusive evidence of the presence of

outlier values. The mean, 5% trimmed mean and the 10% trimmed mean are compared to the median. An analysis of the individual results indicates that a 10% trimmed mean is generally required for either the CI upswing, CI decline, LI upswing or the LI decline in order to obtain similar median and mean profiles. In certain instances a 5% trimmed mean would also provide similar mean and median profiles. Depending on the effect of the outlier, it is possible, for instance to trim the mean by 10% for LI enterprises during the upswing, while for the decline phase a 5% trimmed mean would be sufficient to provide similar median and mean profiles. In several of the ratios a 10% trimmed mean is required for both the CI and LI groups during both the upswing and decline phases in order to provide similar mean and median profiles.

For several indicators it is not possible to obtain similar median and mean profiles in spite of trimming the ratio. The differences between the median and mean values still appear to be large. An analysis of the individual non-trimmed mean profiles is conducted for the 26 ratios that indicate similar mean and median patterns, while the non-parametric tests are used to analyse the remaining ratios.

7.9.2 Results of the median profile analysis

The Mann-Whitney U-test is used to determine whether or not statistically significant differences exist between the independent CI and LI enterprise groups during the upswing and decline phases. The Wilcoxon matched-pairs test is used to determine whether or not statistically significant differences exist between the upswing and decline phases for the CI and for the LI enterprises. An analysis is provided of the four cases highlighted in Table 7.4. The results indicated in Table 7.10 are presented on the basis of the four cases, which are sub-divided into two categories for those ratios that indicate statistically significant differences and those that do not. In addition, the results are also presented per category of financial performance ratios, i.e. profitability, growth, cash flow, value and inflation-adjusted. The results of the Mann-Whitney U-test and Wilcoxon matched-pairs test for each of the indicators included in the study are presented in Tables 7.11-7.15. The results presented in Table 7.10 and Tables 7.11-7.15 are discussed on the basis of the financial ratio categories and, where relevant, interpreted from a financial management perspective.

Table 7.10: Comparisons of the median profile of each financial ratio between CI and LI enterprises and within each financial performance indicator group

Category of financial indicator**	Comparisons of CI and LI enterprises for the upswing phase		Comparisons of CI and LI enterprises for the decline phase		Comparisons of the upswing and decline phase for LI enterprises		Comparisons of the upswing and decline phase for CI enterprises	
	Differences	No differences	Differences	No differences	Differences	No differences	Differences	No differences
Profit-ability	8 53,3 %*	7 46,7 %	8 53,3 %	7 46,7 %	6 40,0 %	9 60,0 %	13 86,6 %	2 13,4 %
Growth	1 12,5 %	7 87,5 %	1 12,5 %	7 87,5 %	5 62,5 %	3 37,5 %	4 50,0 %	4 50,0 %
Cash flow	8 47,1 %	9 52,9 %	8 47,1 %	9 52,9 %	4 23,5 %	13 76,5 %	6 35,3 %	11 65,7 %
Value	4 44,4 %	5 55,6 %	2 22,2 %	7 77,8 %	2 22,2 %	7 77,8 %	1 11,1 %	8 89,9 %
Inflation adjusted	4 40,0 %	6 60,0 %	3 30,0 %	7 70,0 %	0 0,0 %	10 100,0 %	0 0,0 %	10 100,0 %

* The percentages indicate the contribution of the number of ratios that suggest statistically significant differences as opposed to those that do not differ with regard to the total number of ratios within each category

** Three of the indicators (X19, X27 and X31) originally included in the analysis were excluded at this stage due to a low number of valid data points.

7.9.2.1 Analysis of the profitability ratios

The results of the median analyses for the CI and LI enterprises during the upswing and decline phases for the profitability ratios are presented in Table 7.11.

Table 7.11: Statistically significant differences between the CI and LI enterprises for the upswing and decline phases and between the upswing and decline phases for the individual CI and LI enterprise groups for profitability ratios

Ratio	Title	Test 1	Test 2	Test 3	Test 4
X1	Return on total net assets (RONA) (before tax)		**		*
X1A	Return on total net assets (RONA) (after tax)			*	*
X2	Return on total shareholders' interest (ROE) (before tax)			*	**
X2A	Return on total shareholders' interest (ROE) (after tax)			**	*
X3	Return on ordinary shareholders' interest (ROSE) (before tax)				**
X3A	Return on ordinary shareholders' interest (ROSE) (after tax)			**	*
X4	Return on net operating assets (RNOA) (before tax)	*	**		**
X4A	Return on net operating assets (RNOA) (after tax)	*		*	*
X5	Return on sales (ROS) (before tax)	**	*		**
X5A	Return on sales (ROS) (after tax)	**	*		
X6	Net income margin (before tax)	**	*		**
X7	Earnings per share (EPS)	No significant differences - p > 0,05			
X8	Dividend per share (DPS)	*		*	
X9	Turnover to total net assets	***	***		
X10	Interest-bearing debt to total shareholders' interest	*			*

Key to Tables 7.11-7.15:

Hypothesis test	Objective of the hypothesis test	Appropriate hypothesis test
1	Determine statistically significant differences between CI and LI enterprises for upswing (1987-1989) phase	Mann-Whitney U test
2	Determine statistically significant differences between CI and LI enterprises for the decline (1990-1992) phase	Mann-Whitney U test
3	Determine statistically significant differences between upswing and decline phases for LI enterprises	Wilcoxon matched-pairs test
4	Determine statistically significant differences between upswing and decline phases for CI enterprises	Wilcoxon matched-pairs test

* Significant at 5% level, where $p < 0,05$

** Significant at 1% level, where $p < 0,01$

*** Significant at 0,1% level, where $p < 0,001$

Note: Blank cells in the table indicate no statistically significant differences for $p > 0,05$

The results obtained for the ratios (see Table 7.11) of the profitability category indicate that RONA (X1 and X1A), ROE (X2 and X2A) and ROSE (X3 and X3A) before and after tax do not indicate statistically significant differences between the CI and LI enterprises for the upswing phase. Only the RONA before tax (X1) indicates statistically significant differences between CI and LI enterprises during the decline phase. It is possible that the CI enterprises experience a faster decrease in income than the LI enterprises, while the capital base of CI enterprises is also generally larger than LI enterprises due to the higher fixed capital component. The combination of a decrease in earnings in relation to a larger capital base could cause the ratio for the CI enterprises to decrease at a faster rate than the LI enterprises during the decline phase. The remaining ratios with the exception of EPS indicate statistically significant differences between CI and LI enterprises for the upswing phase. Earnings per share (X7) ratio indicates no statistically significant differences between CI and LI enterprises for either of the phases or between the upswing or decline phases for the two groups. In contrast, dividend per share (X8) indicates statistically significant differences between CI and LI enterprises during the upswing phase and between the upswing and decline phase for the LI enterprises. A possible explanation for the differences between X7 and X8 could be attributed to an enterprise that does not react immediately to a decline phase in the economic cycle or adheres to its dividend policy, which may, for example, be to increase dividends by the inflation rate.

The results further indicate that LI enterprises are less sensitive than CI enterprises to an upswing or decline phase in the economic cycle. Only two ratios (return on sales after tax (X5A) and sales to total net assets (X9)) do not indicate statistically significant differences between the upswing and decline phases for the CI enterprises. The traditional profitability ratios such as RONA (after tax), ROE and ROSE (after tax) indicate differences between the upswing and decline phases for both the CI and LI enterprises. The RONA (before tax) and ROSE (before tax) do not indicate statistically significant differences between the upswing and decline for the LI enterprises, but for the CI enterprises. This may allude to the larger differences in the either or both the total and ordinary share capital structures of CI and LI enterprises and the differences in income achieved during the upswing and decline phases of the economic cycle for the two groups.

7.9.2.2 Analysis of the growth ratios

The results of the median analyses for the CI and LI enterprises during the upswing and decline phases for the growth ratios are presented in Table 7.12.

Table 7.12: Statistically significant differences between the CI and LI enterprises for the upswing and decline phases and between the upswing and decline phases for the individual CI and LI enterprise groups for the growth ratios

Ratio	Title	Test 1	Test 2	Test 3	Test 4
X11	Growth in net turnover				**
X12	Growth in dividend per share (DPS)			***	***
X13	Growth in earnings per share (EPS)			***	***
X14	Growth in attributable earnings (ordinary shareholders)			**	
X15	Growth in total net assets	No significant differences p > 0,05			
X16	Growth in total shareholders' interest			*	
X17	Internal growth rate (after tax)	**	*		**
X18	Sustainable growth rate (after tax)			*	**

Note: Refer to Table 7.11 for key to hypothesis tests 1 through 4 and significant levels used in the analysis

The results presented in Table 7.12 indicate that only the internal growth rate after tax (X17) ratio of the growth category indicates statistically significant differences between the CI and LI enterprises for the upswing and also for the decline phase. The differences between the CI and LI enterprises may be caused by the manner in which the reserves of the two groups are utilised during the upswing and decline phases. It is possible that in order to sustain the fixed asset base of CI enterprises and cover fixed costs, reserves show a reduction during the decline phase. During the upswing phase CI enterprises may be in a position to build or increase reserves based on higher margins charged for projects when compared to the LI enterprises. The results further indicate that the growth between the upswing and decline phases of turnover, dividend per share and earnings per share, attributable earnings, total net assets, total shareholders' interest and sustainable growth indicate statistically significant differences for either or both the CI and LI enterprises between the upswing and decline phases (see Table 7.12).

It is possible that the differences between the upswing and decline phases for the CI enterprises may be caused by slower turnover growth rates, which in turn negatively affect

earnings. As a consequence the purchases of new assets are shelved and asset replacement is postponed if possible during the decline phase. Reserves also decrease due to the utilisation of reserves to finance operating activities and cover fixed costs during the decline phase. The opposite situation may be prevalent during the upswing phase.

7.9.2.3 Analysis of cash flow ratios

The results of the median analyses for the CI and LI enterprises during the upswing and decline phases for the cash flow ratios are presented in Table 7.13.

Table 7.13: Statistically significant differences between the CI and LI enterprises for the upswing and decline phases and between the upswing and decline phases for the individual CI and LI enterprise groups for cash flow ratios

Ratio	Title	Test 1	Test 2	Test 3	Test 4
X20	Cash flow (CTA) to total net assets			*	
X21	Cash flow (COA) to total net operating assets			*	
X22	Cash flow (CATA) to total shareholders' interest	No significant differences - p > 0,05			
X23	Cash flow (CATA less preference dividend) to ordinary dividend pay.		*		
X24	Cash flow (CTA) to interest payments (interest coverage)	*			**
X25	Cash flow (CATA) to total debt	**	***		*
X26	Cash flow (CATA) to current liabilities	***	***		
X28	Cash flow (CATA) to [L/T loans repaid + fixed asset + total dividend]				***
X29	Cash flow (NCTA) to [gross non-current assets and net current assets]	No significant differences - p > 0,05			
X30	Cash flow (NCTA) to capital investments				***
X32	Cash flow (NCTA) to [cap. invest. + fin. invest. + capital redemption]	No significant differences - p > 0,05			
X33	Cash flow (CATA) to turnover (margin)	***	**		
X34	Cash flow (CATA less preference dividend) per ordinary share	**	*		
X35	Price per share to cash flow (CATA less preference dividend) per share	No significant differences - p > 0,05			
X36	Working capital to operating cash flow	**	***		*
X37	Cash flow (CATA) to net income after tax (earnings)	***	*	**	
X38	Cash flow (CTA) less interest paid to net income before tax	***	*	**	*

Note: Refer to Table 7.11 for key to hypothesis tests 1 through 4 and significant levels used in the analysis

The results for the cash flow return ratios (X20, X21 and X22) presented in Table 7.13 indicate no statistically significant differences between the CI and LI enterprises for the upswing and decline phase. Ratios X25, X26, X33, X34, X36, X37 and X38 indicate

statistically significant differences for both the CI and LI enterprises during the upswing and decline phases. The results also indicate that rarely (only X38 is applicable in this case) do statistically significant differences occur between the upswing and decline phase for both the CI and LI enterprises. Statistically significant differences between the upswing and decline phases are less apparent among the LI enterprises, while a larger number of ratios indicate statistically significant differences between the upswing and decline phases for the CI enterprises. Only the cash flow to net income before tax (X38) indicates statistically significant differences for each of the four cases (see Table 7.4).

The results for the cash flow ratios indicate that the capital needs and fixed cost structure of CI enterprises could be the cause of the differences between the upswing and decline phases for the group. The converse is apparent among the LI enterprises. Although the income growth of LI enterprises may decrease during a decline phase, the decrease is not as substantial when compared to the upswing phase. The nature of LI enterprises with a smaller fixed asset base and less substantial cyclical movements in turnover and subsequently income over the upswing and decline phase may be a possible reason for the non-significant differences between the upswing and decline phases for the LI enterprises.

7.9.2.4 Analysis of the value ratios

The results of the median analyses for the CI and LI enterprises during the upswing and decline phases for the value ratios are presented in Table 7.14.

The results for the value ratios highlighted in Table 7.14 indicate that economic value added (X39), Tobin's Q-ratio (X41), RONA profitability index (X42) and warranted equity value (X47) indicate statistically significant differences between the CI and LI enterprises for the upswing phase, while only X41 and X42 indicate statistically significant differences for the decline phase. The ROE profitability index (X43) and internal return versus required return (X46) indicate statistically significant differences between the upswing and decline phases for the LI enterprises. Both ratios (X43 and X46) are based on ROE after tax. It would appear that ROE in the context of these ratios is sensitive to the upswing and decline phases of the economic cycle for the LI enterprises. The ROE profitability index (X43) also indicates statistically significant differences between the upswing and decline phases for the CI

enterprises. The remaining value ratios do not indicate any statistically significant differences for any of the four cases (see Table 7.4).

Table 7.14: Statistically significant differences between the CI and LI enterprises for the upswing and decline phases and between the upswing and decline phases for the individual CI and LI enterprise groups for value ratios

Ratio	Title	Test 1	Test 2	Test 3	Test 4
X39	Economic value added (EVA):	*			
X40	Market value-added ratio (MVA):	No significant differences p > 0,05			
X41	Tobin's Q-ratio:	*	**		
X42	Profitability index: (RONA (after tax)/WACC)	**	*		
X43	Profitability index: (ROE (after tax)/K_e)			**	*
X44	Value index: MVE to BVE	No significant differences p > 0,05			
X45	Value index: MVE to BVE per share	No significant differences p > 0,05			
X46	Value index: Internal return versus required return			**	
X47	Warranted equity value (WEV) to book value of equity (BVE)	*			

Note: Refer to Table 7.11 for key to hypothesis tests 1 through 4 and significant levels used in the analysis

Many of the value ratios are based on the capital return and cost of capital of an enterprise. It appears that the differences highlighted in Table 7.14 are caused by higher returns on capital for the CI enterprises during the upswing phase when compared to the LI enterprises over the same period. Although the cost of capital for the two groups may differ, it is possible that these differences are not substantial. The differences between the CI and LI enterprises for those ratios based on market data could be caused by the manner in which the market values CI and LI enterprises during an upswing and decline phase. It is likely that CI enterprises would be considered more favourably by the market during an upswing, while the LI enterprises would indicate less risk for investors during a decline phase.

7.9.2.5 Analysis of the inflation-adjusted ratios

The results of the median analyses for the CI and LI enterprises during the upswing and decline phases for the inflation-adjusted ratios are presented in Table 7.15.

Table 7.15: Statistically significant differences between the CI and LI enterprises for the upswing and decline phases and between the upswing and decline phases for the individual CI and LI enterprise groups for inflation-adjusted ratios

Ratio	Title	Test 1	Test 2	Test 3	Test 4
X48	Return on total net assets (RONA)		**		
X48b	Return on total net assets (RONA)	*	**		
X49	Return on total shareholders' interest (ROE)	No significant differences p > 0,05			
X49b	Return on total shareholders' interest (ROE)	No significant differences p > 0,05			
X50	Return on ordinary shareholders' interest (ROSE)	No significant differences p > 0,05			
X50b	Return on ordinary shareholders' interest (ROSE)	No significant differences p > 0,05			
X51	Earnings per share (EPS)	**	*		
X52	Return on sales (ROS)	*			
X53	Dividend coverage ratio	No significant differences p > 0,05			
X54	Net income margin	*			

Note: Refer to Table 7.11 for key to hypothesis tests 1 through 4 and significant levels used in the analysis

None of the inflation-adjusted ratios indicate statistically significant differences between the upswing and decline phases for either the CI or the LI enterprises (see Table 7.15). Inflation-adjusted return on total net assets (X48) and (X48b) indicate statistically significant differences between the CI and LI enterprises for the decline phase. It is possible that inflation does not significantly affect the LI enterprises, given their reliance on a smaller fixed asset base. However, inflation negatively affects the fixed asset base of CI enterprises due to the additional depreciation write-off and the revaluation of fixed assets for replacement purposes.

The earnings per share (X51), return on sales (X52) and net income margin (X54) ratios indicate statistically significant differences between the CI and LI enterprises during the upswing phase. Furthermore, return on total net assets (X48b) and earnings per share (X51) also indicate statistically significant differences between the CI and LI enterprises for the decline phase. The differences highlighted above may be caused by the faster growth in income of CI enterprises during the upswing phase despite the additional depreciation write-off on the fixed assets of the group. Sales growth during the upswing phase could also occur at a faster rate for the CI enterprises than for the LI enterprises. The remaining inflation-adjusted ratios do not indicate any statistically significant differences for any of the four cases (see Table 7.4).

The results presented in the following section are applicable to those ratios that exhibit approximately normal distributions. The mean profile analysis based on Hotelling's T^2 as discussed in section 7.8 is used to investigate statistically significant differences between the CI and LI enterprises for the appropriate ratios.

7.9.3 Results of the mean profile analysis based on Hotelling's T^2 test

Hotelling's T^2 test is used to determine whether or not the mean values of the CI and LI enterprises during the upswing are the same as the mean values of the CI and LI enterprises during the decline phase. A mean profile analysis is also conducted to determine whether or not the CI and LI profiles are parallel, coincident and horizontal. The tests for coincidence and horizontal profiles are only applicable to ratios which indicate parallel profiles for the CI and LI enterprises. The individual mean profile analysis results based on Hotelling's T^2 test for the 26 ratios which adhere to the required assumption of an approximately normal distribution are indicated in Table 7.16.

Table 7.16: An analysis of the individual mean profiles of ratios that adhere to the assumption of an approximately normal distribution

Ratio category	Ratio Code[1]	Hotelling's T^2		Profile Analysis					
		T^2	p-value	Parallel		Coincident		Horizontal	
				Stat.	p-value	Stat.	p-value	Stat.	p-value
P	X1	5,3372	***	1,3052	0,2575	2,5723	0,0124**	7,2481	0,0090***
P	X1A	1,4935	p > 0,10	0,7834	0,3794	1,2297	0,2233	9,0938	0,0036***
P	X2	1,2615	p > 0,10	0,3490	0,5567	1,3663	0,1766	11,0532	0,0014***
P	X2A	0,3413	p > 0,10	0,2100	0,6483	0,6847	0,4959	12,2041	0,0008***
P	X3	1,5446	p > 0,10	0,1325	0,7170	1,6565	0,1025	10,2263	0,0021***
P	X3A	0,7730	p > 0,10	0,5889	0,4456	0,9635	0,3389	12,4102	0,0009***
P	X5	5,7021	***	2,1811	0,1457	3,0900	0,0032***	7,1605	0,0099***
P	X5A	4,2738	**	0,2310	0,6327	2,7927	0,0072***	4,0072	0,0505*
P	X6	5,6387	***	2,3475	0,1315	2,9754	0,0042***	10,7243	0,0018***
P	X8	2,4143	*	0,0873	0,7684	1,9084	0,0606*	5,1817	0,02607**
P	X9	11,4691	***	0,1512	0,6989	4,0269	0,0001***	1,9796	0,1653
G	X17	0,4843	p > 0,10	0,0166	0,8976	0,7644	0,4474	1,2664	0,2647
CF	X22	0,9337	p > 0,10	1,2045	0,2765	0,7917	0,4314	0,0010	0,9748
CF	X28	0,5881	p > 0,10	0,6592	0,4201	0,7937	0,4306	0,9357	0,3374
CF	X29	1,2979	p > 0,10	2,6367	0,1094	0,0681	0,9459	0,0922	0,7622
CF	X33	5,6734	***	0,5090	0,4787	3,3805	0,0013***	1,0530	0,3095
CF	X36	4,1125	**	1,0965	0,2990	2,3617	0,0212**	0,4152	0,5216
V	X43	0,5957	p > 0,10	0,2987	0,5865	0,9223	0,3598	12,1591	0,0008***
INF	X48	4,8003	**	0,6991	0,4062	2,8586	0,0057***	0,0902	0,7648
INF	X48b	6,6392	***	0,6361	0,4281	3,4425	0,0010***	0,0172	0,8958
INF	X49	1,5464	p > 0,10	0,0325	0,9546	1,7702	0,0815*	2,2952	0,1347
INF	X49b	2,7502	*	0,0029	0,9566	2,3640	0,0211**	1,9787	0,1644
INF	X50	1,6330	p > 0,10	0,0117	0,9139	1,8161	0,0741*	1,7622	0,1891
INF	X50b	2,9351	*	0,0027	0,9585	2,4384	0,0175**	1,5063	0,2242
INF	X52	3,4494	**	1,6057	0,2107	2,2786	0,0268**	1,4480	0,2342
INF	X54	3,4325	**	1,7974	0,1858	2,1629	0,0351**	3,6830	0,0604*

Key: P = profitability; G = growth, CF = cash flow, V = value; INF = inflation-adjusted

[1] A list of the ratio names is provided in Appendix 6D of Chapter 6

* Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level

The findings of Hotelling's T^2 test presented in Table 7.16 indicate that 11 of the 26 ratios suggest statistically significant differences between the CI and LI enterprises when the upswing and decline periods are considered simultaneously at the 5% or even 1% significance level. The majority of these indicators are classified as either profitability or inflation-adjusted ratios. Further perusal of the findings from Hotelling's T^2 test indicates that three ratios are significant at the 10% significance level, while the remaining ratios are not significant at the 10% significance level.

The findings from an analysis of the mean profile also presented in Table 7.16 indicate that all the ratios that highlight approximately normal distributions also exhibit parallel CI and LI profiles. Among the profitability group, six ratios indicate that the CI and LI profiles are not coincident, while two cash flow and six inflation-adjusted ratios also indicate that either the CI or LI enterprises have statistically significantly higher values than the other during the upswing and decline phase at the 10% significance level. Ratios that form part of the profitability group also indicate that the CI and LI profiles are not horizontal for ten of the indicators at the 10% significance level. Among the other ratio categories, only the single-value indicator highlights a non-horizontal profile for the CI and LI enterprises at the 5% or even 1% level. A single inflation-adjusted ratio also indicates a non-horizontal profile at the 10% significance level.

7.9.3.1 Financial interpretation of the mean profile results based on Hotelling's T^2 test

The sales to total net assets (X9), cash flow to turnover (X33), working capital to operating cash flow (X36) and inflation-adjusted return on total net assets (X48b) ratios indicate statistically significant differences between the means of the CI and LI enterprises for both the upswing and decline phases of the economic cycle based on Hotelling's T^2 test. An adjustment in assets in line with a change in sales, especially in CI enterprises, could be a possible reason for the statistically significant differences between CI and LI enterprises. The statistically significant differences between CI and LI enterprises during both the upswing and decline phase for cash flow to sales (X33) could be attributed to the different cash requirements of CI and LI enterprises during the two phases. In addition, it would appear that CI enterprises are affected by the decline in turnover during the decline phase and a substantial increase in turnover during the upswing phase. The profile analysis results suggest that the positive and negative sales growth rates during the upswing and decline phases respectively for the CI enterprises appear to out-perform the LI enterprises over the corresponding phases.

The statistically significant differences between the upswing and decline phases for ratios X1, X1A, X2, X2A, X3 and X3A of the profitability group (see results of horizontal profiles) further indicate the impact of the economy on the turnover and subsequently income of the CI and LI enterprises. For instance, lower inflation, lower interest rates and more favourable

trading conditions are prevalent during the upswing phase and less so during the decline phase.

It would appear that aspects related to working capital requirements during a decline phase significantly affect CI enterprises. LI enterprises may indicate an increase in working capital during the decline period, which could possibly be attributed to the essential necessity of its products/services. It is possible that the differences between CI and LI enterprises for working capital to operating cash flow (X36) could be attributed to fluctuating working capital and cash flow requirements of the groups during the upswing and decline phase of the economic cycle. The profile analysis results suggest that the working capital needs of the CI and LI enterprises differ significantly during the upswing and decline phases. LI enterprises appear to have a greater average need for working capital in relation to the CI enterprises, primarily due to higher stock and debtor levels.

The statistically significant differences between the CI and LI enterprises for the inflation-adjusted return on net total assets (X48b), during both the upswing and decline phase, highlight the effect that inflation has on fixed assets over an extended period of time and the effect of depreciation on the income of CI enterprises. LI enterprises do not generally have a large fixed asset base and therefore it may be assumed that the differences between CI and LI enterprises could be attributed to the effect of inflation on fixed assets and income. The profile analysis results for X48 and X48b shows that the CI and LI profiles are not coincident, but parallel. Furthermore, no statistically significant differences between the upswing and decline phases are evident and the profiles could be considered as horizontal, i.e. the means of the upswing and decline phases are not statistically significantly different irrespective of the nature of the CI and LI enterprises. In contrast, the analysis indicates that the means of groups differ during the upswing and decline phases for X1, which is the same ratio as X48 only in monetary terms.

The return on sales before tax (X5) and after tax (X5A), net income margin (X6), inflation-adjusted return on sales (X52) inflation-adjusted net income margin (X54) are all based on sales and some form of income. All the above-mentioned ratios indicate statistically significant differences (at the 5% significance level) between CI and LI enterprises during the upswing and decline phases. The CI profiles are at a statistically significantly higher level

than the LI profiles over the upswing and decline phases. The positive sentiment created by an economic upswing, it appears, contributes to a faster growth in sales and consequently income among the CI enterprises as opposed to LI enterprises for all these ratios. All these ratios except for X52 indicate statistically significant differences between the mean of the upswing and the decline phase irrespective of the nature of the individual groups, thus rejecting the hypothesis of horizontal profiles. The effect of the upswing and decline phase on the financial position of the two groups as expressed by the above-mentioned ratios is clearly evident from the statistically significant differences between the upswing and decline phases for the two groups.

Inflation-adjusted return on total net assets (X48) and return on net total assets (X1) indicate statistically significant differences between the CI and LI enterprises during the decline phase, but not during the upswing phase, based on Hotelling's T^2 test. The profile analysis also confirms that the LI profile is at a statistically significantly higher level than the CI enterprises over the upswing and decline phase of the economic cycle. This could be attributed to CI enterprises having more fixed assets than LI enterprises and therefore the amount of depreciation written off on the fixed assets is larger, which causes a faster reduction in operating income among CI enterprises than LI enterprises. The reduction in income for the CI enterprises during the decline phase also appears to occur at a faster rate than for the LI enterprises, while the fluctuation in fixed assets during the decline phase would have a greater impact on CI enterprises than on LI enterprises.

The inflation-adjusted return on total shareholders' interest (X49b) and inflation-adjusted return on ordinary shareholders' interest (X50b) indicate the CI and LI enterprises are not coincident, i.e. the mean ratio values of the CI and LI enterprises differ during both the upswing and decline phases for the two indicators.

7.10 Summary

The nature of an enterprise's activities and the fluctuations which occur in the economic cycle are used to distinguish between indicators relevant to the measurement of financial performance in CI and LI enterprises during either or both an upswing or decline phase of the economic cycle. A linear graphic representation of the median and notched box and whisker

plot for each performance indicator was compiled for CI and LI enterprises during an upswing (1987-1989) and decline (1990-1992) period in the economic cycle. This permitted the identification of median patterns and to some extent differences between CI and LI enterprises during the economic cycle based on a single representative measure. The results of the analysis indicated six primary groups of median patterns, i.e. "declining", "declining intersecting", "upward", "torch"-shaped, "funnel"-shaped and "scissors"-shaped. Median patterns in the "declining" group occurred frequently for profitability, growth, value and inflation-adjusted ratios, while the cash flow ratios exhibited a diverse range of median patterns. The majority of the median patterns exhibited by the ratios were expected. However, several median patterns were contrary to what was to be expected.

Similar patterns were exhibited by 45 of the ratios, while 16 indicated opposite patterns. Within the group indicating similar patterns, 21 exhibited patterns which could be considered as differences of degrees. These patterns refer to D1, D3, U1 and U3. An initial analysis of the median patterns suggests that 37 (opposite and differences of degree patterns) may indicate statistically significant differences. The nature of the opposite patterns typically indicates possible differences between CI and LI enterprises for either or both the upswing and decline phases. Differences of degrees patterns would be inclined to indicate a possible difference during either or both the upswing or decline phase of the economic cycle.

The remaining 24 ratio patterns were not expected to indicate differences between the CI and LI enterprises. However, the possibility of statistically significant differences could not be precluded. One ratio could not be used due to an insufficient number of data points.

The median plots together with the notched box and whisker plots are used to determine patterns and preliminary differences between CI and LI groups of enterprises during an upswing and decline period in the economic cycle (see Figure 7.1). In addition, the median is offered as a descriptive statistical measure, which is useful in an analysis of this nature as it is not affected by large outlier values and does not assume any distribution.

The results of the EDA analysis indicate that nine financial performance indicators suggest statistically significant differences between CI and LI enterprises during either the upswing or decline period or for both. The analysis further indicates that five performance indicators (one

profitability, three cash flow and one inflation-adjusted indicator) emphasise preliminary differences between CI and LI enterprises for both the upswing and decline phase in the economic cycle. In addition, four cash flow indicators suggest statistically significant differences between CI and LI enterprises during either an upswing or decline period or during both.

Five of the opposite patterns (three cash flow, one value and one inflation-adjusted ratio) that were expected to indicate statistically significant differences between CI and LI enterprises form part of the group of ratios that suggest statistically significant differences. The remaining four median patterns (two profitability, one cash flow and one inflation adjusted ratio) indicate statistically significant differences between the CI and LI enterprises which were not entirely expected. The substantially higher level of the ratio for one group over the other appears to cause these statistically significant differences. These differences are therefore relevant for making of forecasts.

The latter part of the chapter provides an analysis of the statistically significant differences between CI and LI enterprises during an upswing and decline phase of the economic cycle as exhibited by the behaviour of the financial performance indicators. Mean profiles for all the indicators are compiled in order to complement the median profiles analysed in the first part of the chapter. The median and mean profiles are used together with a 5% and 10% trimmed mean to identify the presence of outliers among the CI and LI enterprises. This enables an identification of those ratios where the mean and median profiles are similar and those that indicate opposite profiles. A strong likelihood of identifying outliers in variables which highlight different mean and median patterns is indicated from the analysis. For those ratios which contain possible outlier values, it is acceptable to use non-parametric statistical techniques which include the Mann-Whitney U-test and Wilcoxon matched-pairs test to determine statistically significant differences between CI and LI enterprises for the upswing and decline phases as well as between the upswing and decline phase for either the CI or LI enterprises respectively.

For those 26 ratios which appear to have less influential values, it is possible to use a profile analysis based on Hotelling's T^2 test. This test accepts that the applicable ratios are assumed to have approximately normal distributions and further implies that the upswing and decline

phases have the same effect on the CI and LI enterprises for a particular ratio. It is also possible to determine whether or not statistically significant differences occur between LI and CI enterprises for the upswing and decline phases separately. A profile analysis of the profile means for the CI and LI enterprises suggests that for a given set of mean profiles it is possible to pose three questions underlying the sample data, i.e. are the CI and LI profiles parallel? If the CI and LI mean profiles are parallel, they may also be coincident, and furthermore the acceptance of parallelism makes it possible to determine whether or not the CI and LI profiles are horizontal, i.e. the mean of the upswing and decline phases indicated statistically significant differences irrespective of the nature of CI and LI enterprises.

The results of the median profile analysis indicate that more ratios in the profitability group suggest statistically significant differences between CI and LI during the upswing phase than the decline phase. Fewer ratios in the other categories highlight statistically significant differences between CI and LI enterprises over the upswing period. The same results are obtained for the LI and CI enterprises during the decline period. The mean profile analysis results indicate that 11 of the 26 ratios that are assumed to exhibit approximately normal distributions suggest that the upswing and decline phases do not have the same effect on the CI and LI enterprises at the 5% significance level. The results of an analysis of the mean profiles of the ratios also indicate that they are all parallel, while five of the ratios among the profitability group and six ratios among the inflation-adjusted group are not coincident at the 5% significance level, i.e. either the CI enterprise group is at a statistically significantly higher level than the LI enterprises, or vice versa over the upswing and decline phase. Among the profitability group, eight of the ratios are also not horizontal at the 1% significance level, thereby suggesting that the mean of the upswing and decline phases are statistically significantly different, irrespective of the nature of the two groups.

The findings presented in this chapter confirm the necessity to interpret the results in the context of the following aspects. Firstly, CI and LI enterprises may not react immediately nor simultaneously to an upswing or decline in the economic cycle. In other words, the period of the lag (if any) may differ between the groups of enterprises. Secondly, the upswing and decline period covers three years. Should a large value be present in any one of the three years during the upswing or decline phase, a median pattern may be obtained which is contrary to what is expected due to the use of average values. Thirdly, the behaviour of the

enterprise or, alternatively, the manner in which the enterprise reacts to an upswing or decline phase is not necessarily considered in the same context as the reaction of the economy to a decrease or increase in levels of production. For instance, an enterprise may continue to follow its dividend policy, which may be to increase dividends by the inflation rate each year. This will account for an upward pattern in the dividend per share. Fourthly, the shape of the median pattern may be misleading and in essence the anticipated difference exhibited by the plot is actually negligible if the scale is considered. Consequently, it is necessary to statistically investigate the differences between the CI and LI enterprises over the individual years of the upswing and decline phases.

In the context of the results presented in this chapter and to overcome the limitations of using a single representative measure, the issues identified above for further analysis are analysed in the following chapter. The analysis in Chapter 8 considers the mean and median profile patterns exhibited by the ratios for the CI and LI enterprises based on the individual years of the research period.

Appendix 7A: Descriptive statistics of financial performance ratios included in the study

CI enterprises: Decline Phase 1990-1992									
Ratio	N	Mean	Median	Lower Quartile	Upper Quartile	Inter-quart. deviation	Standard Deviation	Skewness	Kurtosis
X1 %	33	19,168	18,700	11,234	26,553	7,659	10,652	–0,076	–0,796
X1A %	33	12,247	13,497	7,392	17,957	5,282	8,761	–0,444	0,688
X2 %	33	18,004	19,045	10,793	27,447	8,327	13,786	–0,174	–0,457
X2A %	33	11,931	12,195	6,592	20,152	6,780	10,817	–0,679	0,499
X3 %	33	19,308	19,334	10,322	31,434	10,556	15,234	–0,037	–0,700
X3A %	33	12,953	12,971	6,587	20,969	7,191	11,992	–0,353	0,228
X4 %	33	19,388	19,006	9,825	26,825	8,500	12,223	–0,050	–0,484
X4A %	33	12,475	11,509	7,101	18,945	5,922	9,936	–0,558	0,617
X5 %	33	14,007	10,498	8,364	21,173	6,405	8,644	0,477	–0,562
X5A %	33	9,508	7,604	4,720	12,175	3,728	8,315	0,525	0,614
X6 %	33	11,091	7,729	5,639	17,695	6,028	9,249	0,485	–0,105
X7 %	33	95,616	48,138	20,050	174,425	77,188	124,187	1,057	1,011
X8 %	33	46,795	23,750	11,667	61,667	25,000	53,448	1,817	2,649
X9 %	33	85,605	74,581	45,898	102,157	28,129	55,020	1,557	1,929
X10 %	33	35,168	36,575	16,101	48,255	16,077	22,742	0,743	0,493
X11 %	31	29,631	8,114	2,259	19,493	8,617	90,750	5,129	27,404
X12 %	29	–2,597	3,553	–21,365	17,043	19,204	32,178	-0,144	0,271
X13 %	33	–39,898	–1,244	–20,513	18,503	19,508	138,936	–2,979	10,149
X14 %	33	53,578	6,265	–15,013	43,677	29,345	345,582	2,193	8,615
X15 %	33	39,373	14,139	3,704	31,303	13,799	87,411	3,391	11,918
X16 %	33	38,446	16,287	4,754	20,226	7,736	104,458	4,438	21,324
X17 %	33	6,411	6,020	2,958	12,066	4,554	7,561	–0,868	0,585
X18 %	33	6,234	6,490	2,825	12,162	4,668	9,179	–0,393	–0,346
X19 %	-------	--------	--------	--------	--------	--------	--------	--------	--------
X20 %	33	21,920	21,360	11,542	30,873	9,665	12,863	0,284	–0,659
X21 %	33	22,623	21,495	9,875	31,344	10,735	15,026	0,153	–0,506
X22 %	33	16,135	17,112	8,124	25,662	8,769	12,919	0,047	–0,764
X23 %	27	1872,969	364,490	228,902	561,736	166,417	7713,037	5,188	26,942
X24 %	33	20592,780	1121,276	530,300	2594,109	1031,905	80926,735	4,846	24,531
X25 %	33	29,102	23,765	19,025	40,730	10,852	24,946	1,130	2,812
X26 %	33	39,754	36,516	20,553	54,425	16,936	31,714	0,484	0,542
X27 %	8	6830,142	523,834	296,902	619,172	161,135	18074,768	2,828	7,998
X28 %	31	67,195	75,886	49,265	88,843	19,789	44,782	–0,030	1,997
X29 %	33	5,336	6,305	2,716	11,612	4,448	12,774	–3,314	15,542
X30 %	31	–52,950	88,356	28,517	107,272	39,378	446,043	–3,538	13,112
X31 %	21	17740,142	323,803	–50,699	2201,505	1126,102	64758,999	3,181	10,380
X32 %	31	–0,628	79,945	5,046	124,055	59,505	285,655	–3,268	10,724
X33 %	33	10,104	8,258	4,275	15,295	5,510	8,958	0,902	1,312
X34 %	33	265,437	199,999	34,148	326,128	145,990	377,673	3,565	16,190
X35 %	31	2049,120	807,635	238,317	1424,446	593,065	8647,003	5,448	30,782
X36 %	33	15,045	11,127	4,464	20,594	8,065	24,891	2,713	11,653
X37 %	33	203,146	127,068	105,661	177,464	35,901	264,094	2,236	4,572
X38 %	33	141,860	128,066	105,443	157,196	25,877	143,264	2,446	12,115
X39 value	33	–78471,332	–9342,252	–80641,239	1359,197	41000,218	148591,101	–1,964	4,046
X40 %	33	96,080	66,898	58,989	118,589	29,800	63,630	1,735	2,930
X41 %	33	83,162	63,855	46,731	90,831	22,050	53,661	1,306	0,323
X42 %	33	65,627	66,338	34,586	102,848	34,131	48,287	–0,383	0,500
X43 %	33	57,703	59,926	29,236	97,875	34,319	54,534	–0,774	0,351
X44 %	33	142,180	98,731	71,873	202,667	65,397	118,184	1,517	1,958
X45 %	33	142,180	98,731	71,873	202,667	65,397	118,184	1,517	1,958
X46 %	33	200,974	117,070	67,734	242,033	87,149	257,687	3,784	17,671
X47 %	33	–2906,911	36,021	–33,692	96,092	64,892	17157,108	–5,724	32,840
X48 %	33	8,638	8,004	3,640	15,800	6,080	7,000	–0,019	–0,842
X48_B_ %	33	6,570	6,978	2,021	11,505	4,742	5,440	0,036	–0,882
X49 %	33	6,449	3,640	2,067	12,865	5,399	8,087	0,012	–0,480
X49_B_ %	33	4,613	3,541	1,129	9,743	4,307	5,779	–0,117	–0,630
X50 %	33	6,713	3,767	1,315	12,964	5,825	8,573	0,142	–0,529
X50_B_ %	33	4,687	2,420	1,129	9,762	4,316	5,963	–0,050	–0,726
X51 %	33	96,754	33,610	–6,586	166,425	86,416	276,871	3,627	18,086
X52 %	33	9,660	8,251	4,378	15,712	5,667	8,464	0,498	0,753
X53 %	28	2117,447	136,168	11,341	187,424	88,041	10046,670	5,245	27,645
X54 %	33	6,744	4,538	1,818	13,163	5,672	9,109	0,540	1,245

LI enterprises: Decline Phase 1990-1992									
Ratio	N	Mean	Median	Lower Quartile	Upper Quartile	Inter-quart. deviation	Standard Deviation	Skewness	Kurtosis
X1 %	35	30,602	27,151	19,627	35,379	7,876	17,408	2,064	6,076
X1A %	35	13,916	16,281	10,817	21,321	5,252	19,435	–3,363	16,194
X2 %	35	24,535	21,390	13,349	36,416	11,534	20,553	0,969	2,079
X2A %	35	12,455	13,075	8,655	23,418	7,381	15,774	–1,265	2,408
X3 %	35	26,483	23,483	15,532	37,114	10,791	20,560	0,779	1,691
X3A %	35	13,450	13,838	8,770	24,807	8,019	16,655	–1,695	4,357
X4 %	35	47,019	27,979	23,300	41,792	9,246	96,598	5,451	31,105
X4A %	35	18,832	16,260	11,678	23,072	5,697	70,989	1,225	16,424
X5 %	31	9,492	8,484	5,098	11,995	3,449	6,009	0,906	0,447
X5A %	31	5,687	4,539	2,691	7,518	2,413	4,413	1,217	1,720
X6 %	31	6,936	5,472	2,508	9,562	3,527	5,951	1,023	0,455
X7 %	36	75,626	48,704	17,868	91,478	36,805	85,340	1,995	4,653
X8 %	36	26,487	19,000	6,667	26,433	9,883	32,220	2,536	7,246
X9 %	31	36,008	30,909	16,119	50,845	17,363	28,716	2,352	7,961
X10 %	35	51,370	39,819	15,075	70,448	27,687	47,710	1,436	1,828
X11 %	28	22,947	13,529	7,861	22,553	7,346	51,511	4,625	23,330
X12 %	28	–3,056	0,422	–18,026	10,949	14,488	25,460	0,264	0,929
X13 %	33	–17,701	–9,683	–32,205	12,188	22,197	56,980	–0,979	2,680
X14 %	33	–75,316	–2,880	–35,191	23,280	29,236	421,599	–2,826	9,663
X15 %	33	19,867	17,066	6,562	26,168	9,803	28,948	3,009	14,430
X16 %	33	18,207	18,372	7,628	27,633	10,003	17,207	–0,328	3,144
X17 %	35	9,139	13,634	3,648	16,645	6,498	15,246	–2,178	6,544
X18 %	35	–5,818	8,907	4,756	17,486	6,365	92,415	–5,748	33,615
X19 %	--------	--------	--------	--------	--------	--------	--------	--------	--------
X20 %	35	34,286	25,015	12,324	38,740	13,208	38,937	2,440	6,615
X21 %	35	62,759	34,078	12,471	40,718	14,123	135,812	4,337	20,424
X22 %	35	15,709	9,622	5,006	24,368	9,681	27,500	0,674	2,229
X23 %	26	1311,012	215,591	106,794	350,940	122,073	5446,929	5,075	25,833
X24 %	35	2698,064	706,861	270,674	2303,794	1016,560	8853,340	5,700	33,217
X25 %	35	14,426	12,202	3,030	16,839	6,904	22,386	3,153	14,273
X26 %	35	16,341	14,114	3,390	23,982	10,296	26,583	1,806	8,650
X27 %	11	–1824,520	161,432	108,811	472,171	181,680	7054,151	–3,307	10,955
X28 %	32	71,127	68,607	36,253	118,724	41,235	120,415	0,569	5,270
X29 %	35	8,521	4,072	0,000	13,160	6,580	19,185	1,266	1,979
X30 %	33	578,418	103,847	12,831	204,287	95,728	2807,175	5,500	31,030
X31 %	17	17080,137	522,935	104,218	2762,567	1329,175	60472,905	4,058	16,600
X32 %	33	–164,896	44,051	6,450	86,272	39,911	1049,041	–5,476	30,852
X33 %	31	3,762	3,075	0,385	5,270	2,442	5,805	0,187	1,726
X34 %	35	93,710	77,463	27,032	139,373	56,171	102,150	1,222	2,223
X35 %	33	–40,594	366,721	–1,585	1759,937	880,761	11219,530	–3,997	23,923
X36 %	35	39,310	37,939	18,270	50,903	16,316	39,786	0,049	4,529
X37 %	35	120,317	82,706	32,830	157,035	62,102	175,524	1,179	1,900
X38 %	35	120,820	90,835	61,041	130,869	34,914	163,690	3,932	19,376
X39 value	35	–35891,518	–271,081	–16608,826	7176,639	11892,732	153182,771	–5,022	27,239
X40 %	35	77,900	55,581	45,122	94,616	24,747	50,220	1,442	0,848
X41 %	35	122,545	105,318	61,655	147,859	43,102	74,511	1,256	0,815
X42 %	35	77,693	97,177	67,729	116,218	24,245	121,695	–3,621	17,663
X43 %	35	62,228	68,960	40,309	110,979	35,335	76,465	–1,354	2,337
X44 %	35	141,847	93,240	51,701	183,505	65,902	122,280	1,454	1,479
X45 %	35	141,847	93,240	51,701	183,505	65,902	122,280	1,454	1,479
X46 %	35	163,984	86,852	49,248	265,634	108,193	314,848	0,081	6,894
X47 %	33	109,692	50,830	22,714	83,179	30,232	282,358	4,696	24,715
X48 %	35	17,590	15,374	8,466	22,135	6,835	14,449	1,267	2,178
X48_B_%	35	15,665	12,548	6,740	20,499	6,879	12,881	1,208	1,641
X49 %	35	11,197	8,391	2,122	22,999	10,438	16,526	0,794	0,737
X49_B_%	35	9,816	6,372	2,019	18,700	8,340	14,549	0,774	0,489
X50 %	35	11,688	8,382	2,071	23,834	10,882	16,621	0,704	0,588
X50_B_%	35	10,203	6,437	1,934	18,874	8,470	14,545	0,718	0,427
X51 %	35	17,165	4,442	–15,708	34,265	24,987	138,620	1,336	5,255
X52 %	31	6,425	5,462	2,843	8,838	2,998	5,049	0,891	0,262
X53 %	25	–12,366	79,656	–73,345	140,658	107,001	303,520	–2,773	9,226
X54 %	31	3,868	2,450	0,550	6,262	2,856	4,991	1,260	1,398

CI enterprises: Upswing Phase 1987-1989									
Ratio	N	Mean	Median	Lower Quartile	Upper Quartile	Inter-quart. deviation	Standard Deviation	Skewness	Kurtosis
X1 %	32	25,525	26,524	15,771	31,535	7,882	13,159	1,265	3,836
X1A %	32	16,472	16,250	11,676	20,780	4,552	8,170	2,204	9,235
X2 %	32	27,436	29,015	15,533	35,440	9,954	15,440	0,812	1,017
X2A %	32	18,062	17,479	11,620	22,979	5,679	9,162	1,458	4,256
X3 %	32	28,725	29,171	16,148	37,590	10,721	16,054	0,617	0,346
X3A %	32	19,030	17,892	12,312	23,745	5,717	9,605	1,110	2,587
X4 %	32	30,064	26,230	15,829	34,191	9,181	31,208	4,531	23,573
X4A %	32	19,222	16,434	10,568	21,547	5,490	19,920	4,589	23,836
X5 %	30	17,173	13,234	10,590	24,025	6,718	8,856	1,084	0,918
X5A %	30	11,260	9,117	6,854	14,791	3,968	6,890	1,420	1,593
X6 %	30	15,517	12,210	8,236	23,048	7,406	9,071	1,157	1,220
X7 %	33	97,496	64,300	21,707	144,617	61,455	91,353	1,234	1,540
X8 %	32	36,908	23,333	9,792	65,000	27,604	30,820	0,643	–0,959
X9 %	30	81,918	63,663	42,571	98,261	27,845	63,178	2,351	6,429
X10 %	32	26,591	16,829	7,391	32,200	12,404	30,119	2,250	5,708
X11 %	28	40,310	21,835	16,762	27,757	5,498	94,183	5,187	27,234
X12 %	29	43,698	29,573	17,553	49,777	16,112	59,540	2,949	12,384
X13 %	32	71,104	40,530	24,078	90,331	33,127	103,936	2,655	7,970
X14 %	32	96,575	47,232	33,117	94,914	30,899	120,197	2,372	5,326
X15 %	32	22,312	13,898	9,801	21,671	5,935	28,802	2,835	8,331
X16 %	32	24,728	16,857	12,078	25,587	6,754	27,345	3,102	11,111
X17 %	32	10,330	10,058	7,385	14,480	3,547	6,708	–0,587	1,379
X18 %	32	11,688	11,147	7,476	17,687	5,105	7,861	–0,316	0,914
X19 %	--------	--------	--------	--------	--------	--------	--------	--------	--------
X20 %	32	24,904	25,296	16,008	34,182	9,087	15,524	0,028	0,770
X21 %	32	23,440	26,906	14,318	37,306	11,494	40,757	–0,741	10,812
X22 %	32	20,183	21,633	12,149	27,275	7,563	13,927	0,231	1,470
X23 %	26	377,289	340,091	283,159	394,275	55,558	190,307	1,448	2,984
X24 %	31	22871,302	2374,093	625,978	7039,029	3206,525	80170,734	5,064	26,791
X25 %	32	53,374	35,379	20,359	54,859	17,250	83,669	4,227	20,634
X26 %	32	61,606	44,058	28,829	71,774	21,473	83,019	4,021	19,515
X27 %	11	548,687	271,445	205,811	317,774	55,982	985,242	3,255	10,704
X28 %	30	99,459	102,880	74,996	114,843	19,924	50,580	–0,185	1,945
X29 %	32	10,092	8,999	5,626	16,259	5,317	9,185	–0,267	1,172
X30 %	29	–73,404	153,376	97,524	231,448	66,962	1198,674	–4,945	25,609
X31 %	18	2606,561	363,091	–76,670	1900,079	988,375	7718,756	2,845	9,192
X32 %	30	97,555	93,820	56,336	133,194	38,429	238,996	–2,013	10,115
X33 %	30	12,219	10,047	6,392	16,595	5,101	12,064	–0,085	1,890
X34 %	32	205,175	156,450	60,677	247,327	93,325	216,535	2,561	9,362
X35 %	30	994,046	614,321	417,120	854,383	218.632	1496,313	2,622	8,066
X36 %	32	26,114	15,024	10,489	25,648	7,579	41,438	4,488	22,081
X37 %	32	150,669	129,089	109,898	154,943	22,522	218,394	3,957	21,553
X38 %	32	101,918	108,770	93,056	123,049	14,997	78,720	–2,631	11,078
X39 value	32	–38941,741	–5229,963	–45254,125	2874,770	24064,448	81059,882	–1,889	2,650
X40 %	32	97,176	89,309	63,996	110,567	23,285	53,337	1,487	2,537
X41 %	32	79,784	74,202	43,933	103,140	29,603	46,312	1,576	3,172
X42 %	32	85,866	85,608	65,224	99,566	17,171	38,013	0,943	2,496
X43 %	32	87,556	82,578	62,035	116,464	27,215	41,317	0,771	1,231
X44 %	32	140,419	146,588	64,868	184,957	60,044	79,893	0,791	0,517
X45 %	32	140,419	146,588	64,868	184,957	60,044	79,893	0,791	0,517
X46 %	31	398,330	174,393	101,480	315,738	107,129	897,396	4,801	24,564
X47 %	32	–2929,576	41,084	–12,330	108,641	60,485	17428,658	–5,644	31,904
X48 %	32	10,181	9,025	5,057	13,462	4,202	7,733	1,950	6,284
X48_B_%	32	7,755	7,014	4,299	9,989	2,845	6,906	2,960	12,458
X49 %	32	9,230	7,910	4,410	13,344	4,467	8,039	1,793	6,079
X49_B_%	32	6,796	6,438	2,769	9,333	3,282	7,141	2,862	12,462
X50 %	32	9,352	7,914	4,029	14,106	5,039	8,246	1,608	5,169
X50_B_%	32	6,795	6,579	2,077	9,509	3,716	7,239	2,724	11,690
X51 %	32	76,140	47,582	15,466	111,163	47,849	126,495	3,611	16,391
X52 %	30	11,653	9,310	5,431	16,127	5,348	7,990	1,323	2,048
X53 %	30	102,769	92,097	27,862	176,341	74,240	117,979	0,690	1,037
X54 %	30	9,996	7,103	4,132	14,369	5,119	8,222	1,368	2,294

LI enterprises: Upswing Phase 1987-1989									
Ratio	N	Mean	Median	Lower Quartile	Upper Quartile	Inter-quart. deviation	Standard Deviation	Skewness	Kurtosis
X1 %	34	33,955	28,903	21,052	42,771	10,860	22,279	2,367	8,771
X1A %	34	21,789	18,142	14,952	23,487	4,268	14,968	2,537	9,369
X2 %	34	32,588	28,439	18,263	44,826	13,281	24,771	1,611	6,706
X2A %	34	21,143	19,008	14,566	27,356	6,395	16,562	1,388	7,995
X3 %	34	35,466	33,672	19,031	45,627	13,298	25,106	1,308	5,584
X3A %	34	23,699	21,243	16,574	29,623	6,525	17,540	0,935	5,391
X4 %	34	40,366	34,433	22,598	51,334	14,368	28,402	2,051	5,392
X4A %	34	25,957	21,661	15,440	29,181	6,871	20,395	2,536	7,553
X5 %	25	10,238	10,157	3,755	14,301	5,273	6,297	0,346	–0,940
X5A %	25	6,500	5,879	2,082	9,128	3,523	4,742	0,583	–0,481
X6 %	25	8,459	8,278	3,377	12,599	4,611	6,497	0,290	–0,453
X7 %	34	63,716	42,257	25,066	85,024	29,979	60,650	1,275	1,341
X8 %	34	21,089	12,042	4,596	26,667	11,034	23,475	1,821	2,985
X9 %	25	35,958	26,775	18,615	42,715	12,050	24,853	0,960	–0,227
X10 %	34	50,859	30,459	14,166	55,700	20,767	61,883	2,651	8,397
X11 %	26	45,868	25,913	14,149	34,963	10,407	84,044	3,877	15,607
X12 %	24	30,665	31,492	17,856	49,687	15,916	33,373	–1,031	2,616
X13 %	34	47,376	44,060	18,328	72,469	27,071	163,204	0,689	9,797
X14 %	36	115,700	46,575	26,795	93,669	33,437	237,908	2,706	8,359
X15 %	36	34,816	23,205	11,561	33,286	10,862	48,575	3,779	16,701
X16 %	36	46,146	21,233	14,430	40,704	13,137	108,544	5,636	32,941
X17 %	34	12,524	15,258	12,629	17,572	2,471	30,288	–3,860	21,516
X18 %	34	12,292	17,007	9,560	21,688	6,064	29,297	–4,058	21,672
X19 %	--------	--------	--------	--------	--------	--------	--------	--------	--------
X20 %	34	22,320	19,753	12,176	29,956	8,890	25,660	1,518	4,299
X21 %	34	29,095	21,424	11,878	38,635	13,379	35,652	2,137	6,344
X22 %	34	13,398	17,296	0,000	23,890	11,945	25,827	–0,711	5,047
X23 %	29	141,230	196,043	87,838	455,945	184,054	933,362	–1,662	6,176
X24 %	34	2740,160	949,078	176,614	3010,122	1416,754	5345,424	4,029	19,323
X25 %	34	19,036	10,177	0,000	26,936	13,468	29,000	1,668	3,524
X26 %	34	23,358	12,984	0,000	35,084	17,542	34,136	1,335	1,289
X27 %	18	544,855	241,477	127,961	448,003	160,021	1517,466	0,880	3,604
X28 %	31	73,256	81,967	–19,568	124,780	72,174	126,192	0,269	1,725
X29 %	34	5,909	8,036	–0,248	12,878	6,563	21,778	0,503	6,146
X30 %	31	56,874	50,756	–89,368	257,008	173,188	739,240	–1,242	10,877
X31 %	20	15202,756	115,606	–125,230	1812,196	968,713	39557,673	2,537	5,344
X32 %	31	67,855	60,274	–73,253	141,063	107,158	202,643	0,923	1,775
X33 %	25	4,083	2,213	0,000	6,494	3,247	7,000	0,420	1,036
X34 %	34	71,049	39,221	–2,896	113,852	58,374	181,362	0,457	3,166
X35 %	31	1073,864	450,653	–72,419	1426,960	749,690	4099,595	1,472	7,255
X36 %	34	36,355	31,160	21,260	51,706	15,223	44,971	–0,116	4,117
X37 %	34	42,730	78,771	0,000	104,345	52,173	105,349	–1,498	2,303
X38 %	34	42,931	67,122	16,369	101,560	42,596	102,405	–2,434	8,312
X39 value	34	1509,749	1097,556	–11924,224	5674,995	8799,609	21048,120	0,173	1,495
X40 %	34	90,057	74,368	55,309	130,943	37,817	48,636	0,906	–0,003
X41 %	34	130,692	97,865	75,261	192,223	58,481	73,353	0,863	–0,670
X42 %	34	125,583	109,541	82,363	126,524	22,081	84,212	1,713	4,141
X43 %	34	136,281	44,408	-1,930	194,251	98,091	330,142	2,717	11,543
X44 %	34	158,283	130,086	77,459	208,500	65,520	101,930	0,949	–0,168
X45 %	34	158,283	130,086	77,459	208,500	65,520	101,930	0,949	–0,168
X46 %	34	386,702	173,106	84,452	403,799	159,673	543,844	2,522	6,296
X47 %	34	150,389	79,230	39,335	158,086	59,375	325,418	2,571	8,297
X48 %	34	17,583	13,680	7,280	25,211	8,965	16,523	1,930	5,454
X48_B_%	34	15,577	12,599	5,744	21,577	7,916	14,379	1,619	3,611
X49 %	34	14,908	11,067	2,754	25,069	11,157	17,553	1,707	5,161
X49_B_%	34	13,222	9,664	2,303	19,574	8,635	15,129	1,588	3,630
X50 %	34	15,098	10,412	3,193	25,931	11,369	17,741	1,631	4,770
X50_B_%	34	13,229	8,974	2,662	20,106	8,722	15,205	1,559	3,512
X51 %	34	15,843	13,657	1,204	40,045	19,421	60,332	–1,389	7,340
X52 %	25	6,8553	6,2282	2,3186	10,2964	3,9889	5,7152	0,5451	–0,5464
X53 %	31	107,3384	74,8865	–4,7875	147,3580	76,0728	275,4228	2,3458	8,5756
X54 %	25	5,0763	4,3488	1,0218	7,7314	3,3548	5,9728	0,3588	0,3031

Mean, 5% trimmed mean and 10% trimmed mean values for the ratios included in the study

LI enterprises: Upswing phase

Ratio	Mean all data	5% trimmed mean	10% trimmed mean
X1	33,954747	32,029024	31,234183
X1A.	21,788503	20,591064	19,721898
X2.	32,587999	31,313031	30,941492
X2A.	21,143469	20,547699	20,014517
X3.	35,466474	34,382013	33,986088
X3A.	23,699211	23,274190	22,520470
X4.	40,365670	38,487860	36,357881
X4A.	25,957255	24,469485	22,502768
X5.	10,237583	10,088085	9,905872
X5A.	6,499951	6,410717	6,253632
X6.	8,458586	8,459238	8,262448
X7.	65,28265	63,4021	57,45596
X8.	21,08903	19,36879	17,19018
X9.	35,957559	34,894255	33,682769
X10	50,859488	44,450589	38,895104
X11	45,868201	32,310694	25,139443
X12.	35,98105	35,42672	35,63885
X13.	47,37636	43,91171	49,10185
X14.	115,699644	98,862378	71,582945
X15.	34,816262	28,884013	24,933499
X16.	46,146458	29,261450	26,892556
X17.	12,524242	15,413508	14,823436
X18.	12,291503	15,340795	15,495408
X19.	-------	-------	-------
X20.	22,320419	20,984360	19,669258
X21.	29,094928	26,410890	24,155907
X22.	13,398062	14,140120	13,196183
X23.	141,230442	165,797698	250,828542
X24.	2740,159958	2019,532774	1762,404952
X25.	19,035581	16,969929	15,490387
X26.	23,357772	21,601923	18,771618
X27.	544,855024	544,855024	519,502131
X28.	73,255955	73,086260	68,977001
X29.	5,909434	5,488981	5,780609
X30.	56,873960	80,845027	83,442956
X31.	15202,755795	10195,862906	3769,025279
X32.	67,855069	60,330483	49,931260
X33.	4,082766	4,073903	3,841703
X34.	76,85873	78,95549	64,88848
X35.	1355,064	1173,071	1066,455
X36.	36,355258	37,028175	34,912926
X37.	42,729882	48,530086	58,193469
X38.	42,931407	52,106365	58,944583
X39 value	1509,749181	1514,232741	1232,365697
X40.	90,057161	88,016532	85,766533
X41.	130,692276	128,466936	123,359330
X42.	125,583371	121,212273	115,039973
X43.	106,123976	104,585415	101,775445
X44.	158,282929	155,039356	147,577818
X45.	158,282929	155,039356	147,577818
X46.	386,702349	337,058347	263,885022
X47.	150,389367	131,954853	97,336174
X48.	17,583348	16,209497	15,358968
X48b	15,577209	14,515099	13,771683
X49.	14,907719	13,833147	13,070193
X49b	13,221683	12,307236	11,412592
X50	15,098271	14,039841	13,337386
X50b	13,228614	12,316296	11,427574
X51.	16,33039	19,01525	20,4452
X52.	6,855276	6,703902	6,567314
X53.	107,338400	85,765235	73,916384
X54.	5,076279	4,997175	4,997908

LI enterprises: Decline phase

Ratio	Mean all data	5% trimmed mean	10% trimmed mean
X1	30,602201	29,278998	28,279276
X1A.	13,916167	15,920952	16,070587
X2.	24,535239	23,613379	23,311182
X2A.	12,455417	13,210529	14,237436
X3.	26,482881	25,645090	25,640509
X3A.	13,449608	14,550637	15,691962
X4.	47,018698	32,743632	30,264085
X4A.	18,832500	17,110463	16,597180
X5.	9,492050	9,318879	8,895265
X5A.	5,686557	5,475491	5,170569
X6.	6,935580	6,736011	6,230048
X7	72,23186	65,48126	57,09373
X8	26,48742	23,48668	20,35824
X9.	36,007540	33,119870	31,864776
X10	51,370103	48,536419	44,177216
X11	22,947314	15,269178	14,739025
X12.	1,95841	1,095795	0,8771787
X13.	–16,22717	–15,29639	–10,20288
X14.	–75,316399	–41,389065	–16,128675
X15.	19,867099	17,418138	16,485931
X16.	18,206936	18,406818	18,436127
X17.	9,138938	10,163500	11,383769
X18.	–5,818039	8,964932	10,125042
X19.	--------	-------	-------
X20.	34,285599	31,056885	27,000979
X21.	62,759450	44,097265	31,494006
X22.	15,709238	15,610501	13,676032
X23.	1311,011602	274,682345	251,252228
X24.	2698,064320	1268,087115	1146,102828
X25.	14,426082	12,288479	11,432692
X26.	16,341150	15,038060	13,942870
X27.	–1824,520397	–1824,520397	238,892684
X28.	71,127423	68,320688	71,065647
X29.	8,520687	7,891641	6,417845
X30.	578,418321	137,630809	101,688837
X31.	17080,137256	17080,137256	2836,906375
X32.	–164,895680	3,321967	18,923537
X33.	3,761956	3,872176	3,503638
X34.	92,80771	88,69925	82,00308
X35	–166,3641	817,1212	653,7951
X36.	39,310339	39,548593	37,947405
X37.	120,317491	116,698142	102,210386
X38.	120,820047	102,247940	96,868357
X39 value	–35891,517651	–14070,019282	–6613,371232
X40.	77,899927	75,950102	70,463946
X41.	122,544858	118,894179	111,930151
X42.	77,693137	89,909813	93,773282
X43.	62,228378	65,608443	72,041933
X44.	141,847083	134,579242	122,671778
X45.	141,847083	134,579242	122,671778
X46.	163,983841	170,078109	140,199101
X47.	109,692014	70,782284	62,509143
X48.	17,590036	16,990821	16,051171
X48b	15,66467	15,054158	14,289170
X49.	11,197042	10,737174	10,087792
X49b	9,816187	9,532782	8,783951
X50.	11,687922	11,273101	10,727106
X50b	10,202706	9,940388	9,273538
X5lc	15,07613	8,906177	4,251736
X52.	6,424588	6,220351	5,953268
X53.	–12,365718	26,466011	43,230219
X54.	3,868118	3,557320	3,240189

CI enterprises: Upswing phase

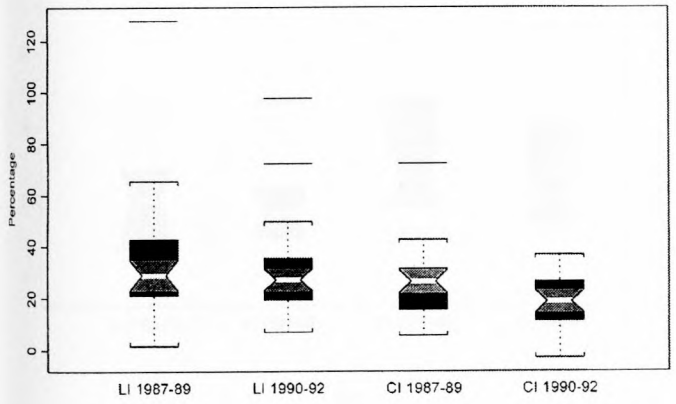
Ratio	Mean all data	5% trimmed mean	10% trimmed mean
X1	25,525324	241,624283	24,658059
X1A.	16,472157	15,767826	15,988775
X2	27,436213	26,625762	26,196441
X2A'	18,061859	17,435047	17,206410
X3	28,724560	28,000000	27,633880
X3A	19,030178	18,467677	18,343413
X4	30,063980	25,582131	25,608458
X4A	19,222019	16,347447	15,994259
X5	17,173476	16,653637	16,271524
X5A	11,260295	10,831884	10,152475
X6	15,516960	14,886314	14,465328
X7	88,54069	85,79452	80,62971
X8	35,00895	34,05954	32,37288
X9.	81,917889	75,638276	69,489218
X10.	26,590999	23,790983	20,558974
X11	40,309822	23,342279	23,132737
X12.	35,1748	35,56634	34,56542
X13.	73,38433	65,33736	53,50998
X14.	96,575328	85,765710	68,464461
X15	22,311964	19,568804	15,659514
X16.	24,727783	21,896201	18,628997
X17	10,329644	10,502527	10,662493
X18,	11,687772	11,819171	11,919025
X19.	-------	-------	-------
X20.	24,903921	24,822504	24,995350
X21.	23,439676	24,155560	25,095423
X22.	20,182693	20,142572	19,786952
X23.	377,289352	365,250327	357,579795
X24.	22871,302192	9320,327753	4229,691781
X25.	53,374101	42,320300	38,204591
X26.	61,605685	51,251310	48,407467
X27.	548,687403	548,687403	277,522973
X28.	99,458742	100,326870	98,934689
X29.	10,092387	10,234162	10,316205
X30.	–73,403642	122,281698	145,991870
X31.	2606,561488	2606,561488	1490,169937
X32.	97,554850	114,777487	104,310400
X33.	12,218857	12,606049	11,831366
X34.	195,9639	171,5900	163,4344
X35.	1043,504	903,6686	770,3399
X36.	26,114094	20,034014	17,725989
X37.	150,668702	129,097148	130,495228
X38.	101,917678	108,616154	111,810072
X39 value	–38941,740915	–34551,321598	–23245,530701
X40.	97,175908	94,023026	89,828903
X41.	79,784306	76,240753	72,682478
X42.	85,866371	84,163436	83,816855
X43.	87,555674	85,893203	85,272067
X44.	140,419164	136,357846	132,229285
X45.	140,419164	136,357846	132,229285
X46.	398,330122	253,307818	198,245684
X47.	–2929,576416	33,035985	42,021576
X48.	10,181183	9,514833	9,386970
X48b	7,755381	6,987300	6,833934
X49.	9,229869	8,590821	8,538922
X49b	6,795585	6,066724	6,045167
X50.	9,351864	8,725027	8,710636
X50b	6,795056	6,070238	6,088638
X51.	70,90898	54,54792	51,09619
X52.	11,652897	11,186373	10,587977
X53.	102,768903	101,275964	93,225802
X54.	9,996381	9,437351	8,943853

CI enterprises: Decline phase

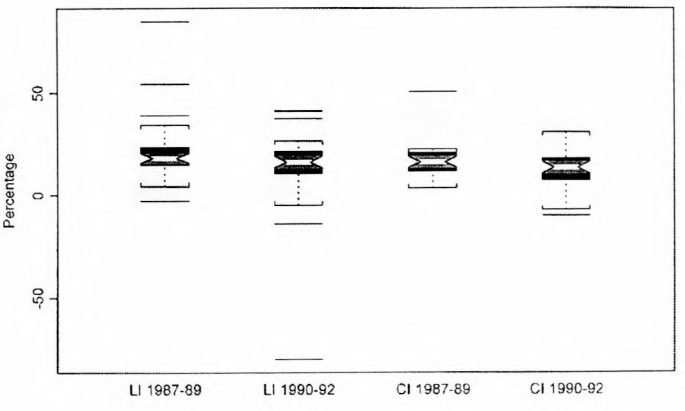
Ratio	Mean all data	5% trimmed mean	10% trimmed mean
X1	19,1683165	19,312792	19,319273
X1A.	12,2467828	12,369249	12,527822
X2.	18,0035226	18,038074	18,359919
X2A.	11,9312843	12,073269	12,669052
X3.	19,3083240	19,351812	19,534861
X3A.	12,9533295	13,072783	13,309238
X4.	19,3875193	19,331540	19,520697
X4A.	12,4747237	12,757687	12,919693
X5.	14,0065617	13,909436	13,610440
X5A.	9,5075161	9,440070	9,052524
X6.	11,0908659	10,970808	10,769986
X7	95,61592	90,94523	84,08322
X8	46,79545	43,3629	36,56481
X9.	85,6048377	82,872516	76,156505
X10.	35,1681798	34,118607	33,470491
X11	29,6306858	14,530359	10,644983
X12.	0,8485401	0,5634163	1,09562
X13.	–39,89823	–27,18589	–12,86304
X14.	53,5782575	34,859431	18,739421
X15.	39,3729231	29,436350	18,886281
X16.	38,4464086	23,819580	15,649766
X17.	6,4110123	6,688434	7,195388
X18.	6,2344722	6,347370	6,592540
X19.	-------	-------	-------
X20.	21,9197172	21,728660	21,595685
X21.	22,6230388	22,657668	22,367189
X22.	16,1349491	16,091292	16,107002
X23.	1872,9694828	413,021742	402,270996
X24.	20592,7803366	7724,332555	1524,151252
X25.	29,1019385	27,981717	27,128467
X26.	39,7537566	38,998771	38,636307
X27.	6830,1415299	6830,141530	6830,141530
X28.	67,1946606	66,179484	68,710432
X29.	5,3364827	6,718774	6,761891
X30.	–52,9499964	7,199439	71,597637
X31.	17740,1423977	8145,836202	1860,993396
X32.	–0,6278567	30,473176	66,865773
X33.	10,1037626	9,745342	9,456373
X34.	265,4372	216,9634	199,2283
X35.	2062,731	740,6825	729,5526
X36.	15,0445683	12,748884	12,609243
X37.	203,1457263	188,821487	148,546326
X38.	141,8603769	132,120909	129,301439
X39 value	–78471,3320343	–66295,784115	–53917,052617
X40.	96,0804514	92,168767	85,693514
X41.	83,1619914	80,835678	75,654308
X42.	65,6266948	65,871424	67,359570
X43.	57,7033921	59,810211	62,338750
X44.	142,1804120	134,546556	125,104672
X45.	142,1804120	134,546556	125,104672
X46.	200,9744947	166,952471	156,402799
X47.	–2906,9109396	–45,377333	32,526509
X48.	8,6381569	8,731534	8,719430
X48b	6,5697808	6,616161	6,539284
X49.	6,4487752	6,479808	6,523699
X49b	4,6133324	4,651042	4,756991
X50	6,7132443	6,741704	6,632738
X50b	4,6870244	4,719940	4,790677
X5l	96,75385	68,85652	64,38212
X52.	9,6601234	9,562110	9,253203
X53.	2117,4466851	247,874848	109,622274
X54.	6,7444275	6,623482	6,336384

Appendix 7B: Box and whisker plots of financial performance ratios included in the study

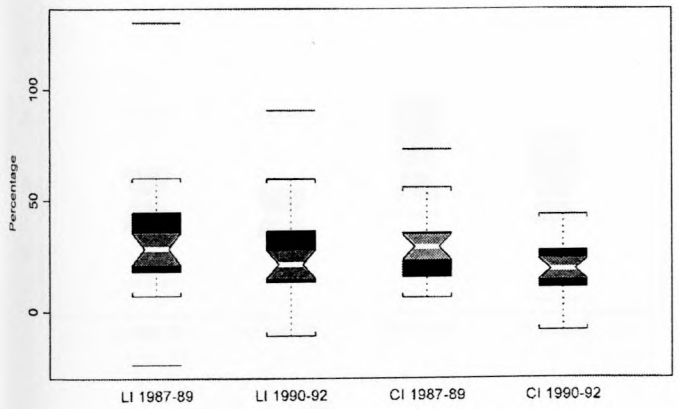
X1



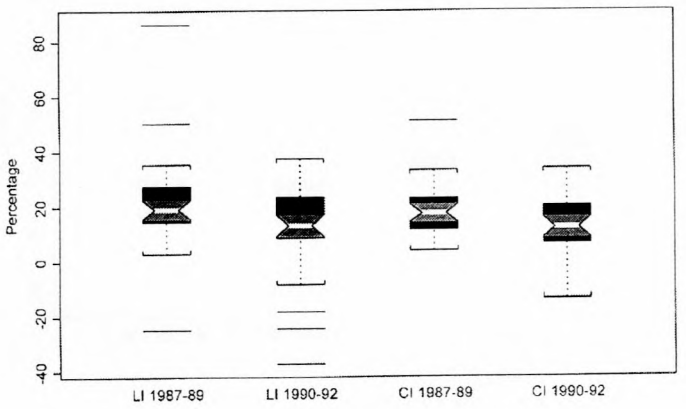
X1A



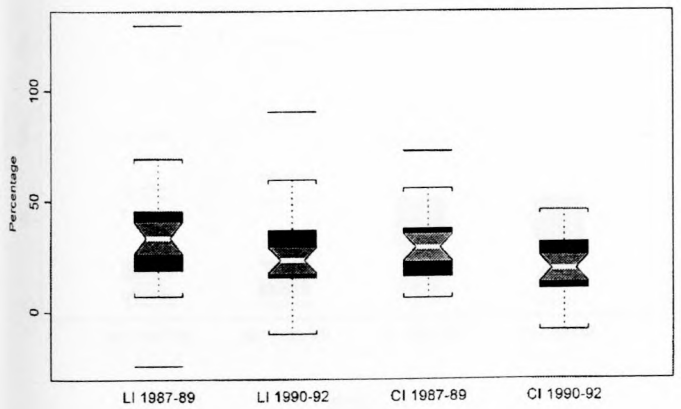
X2



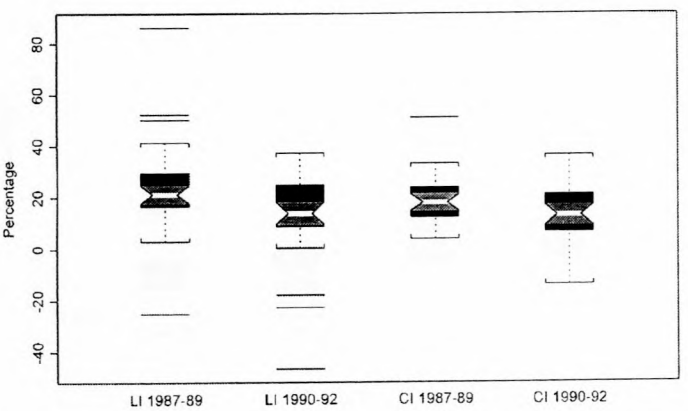
X2A



X3



X3A



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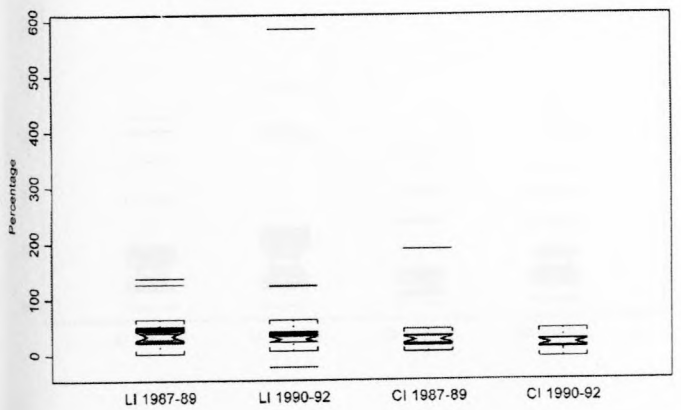

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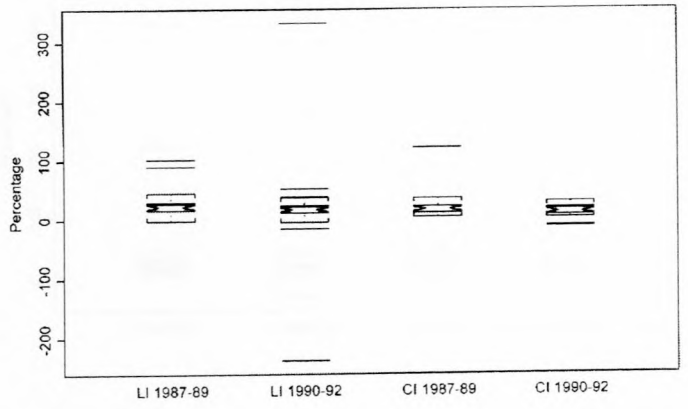

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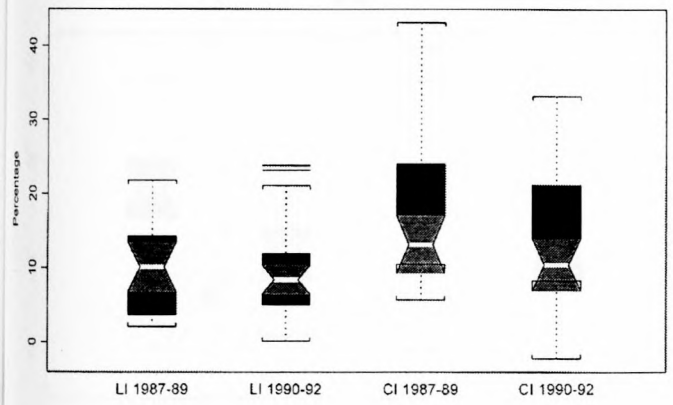

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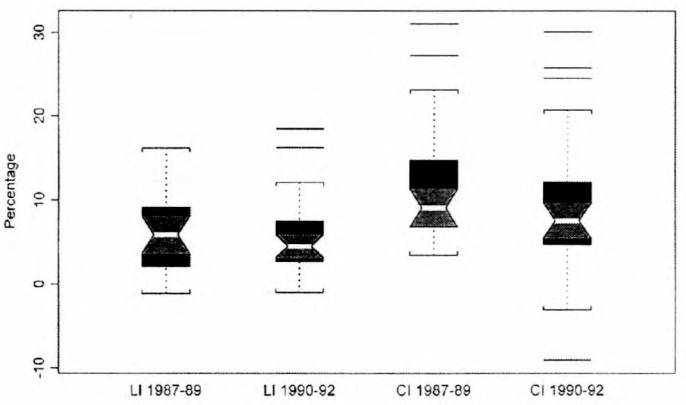

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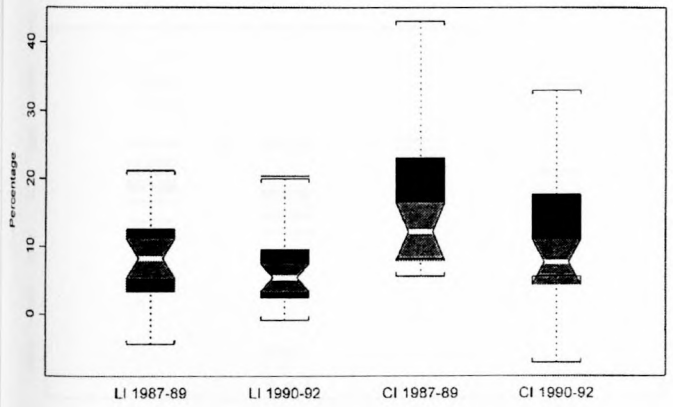

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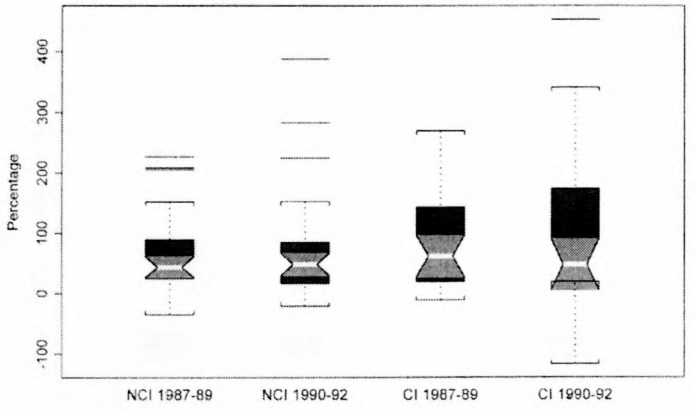

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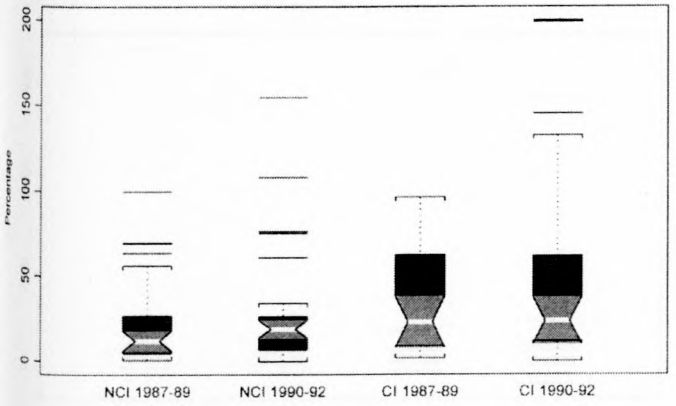

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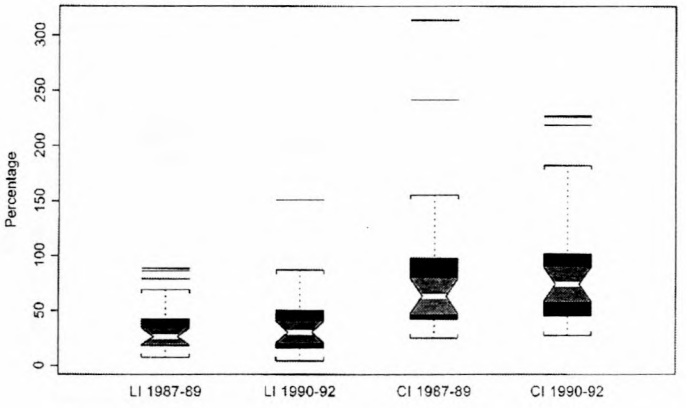

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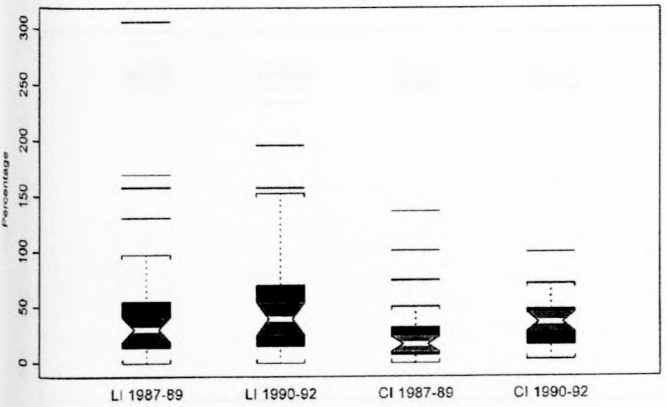

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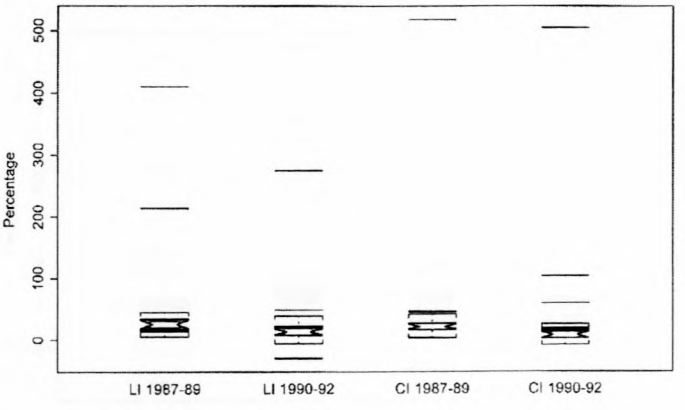

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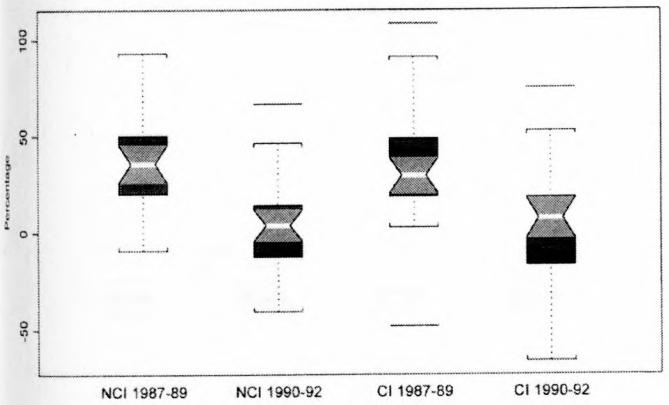

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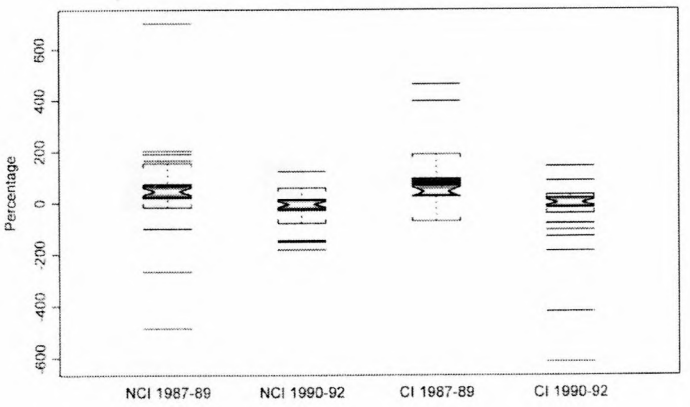

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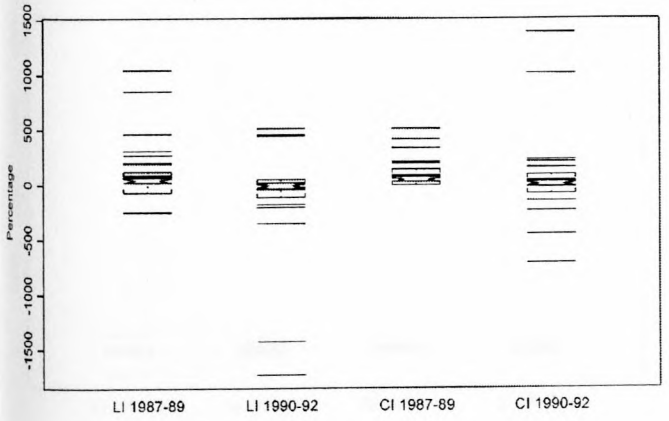

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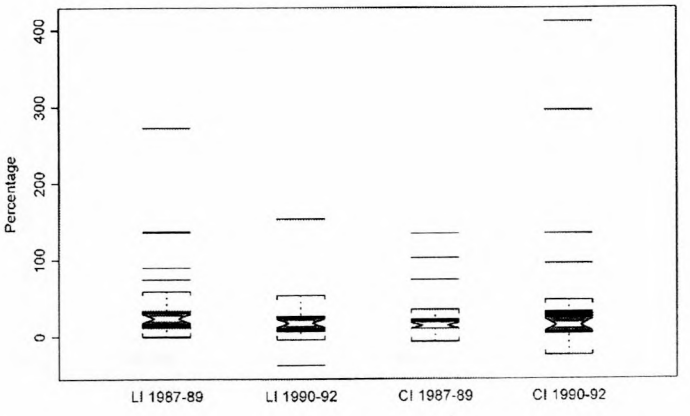

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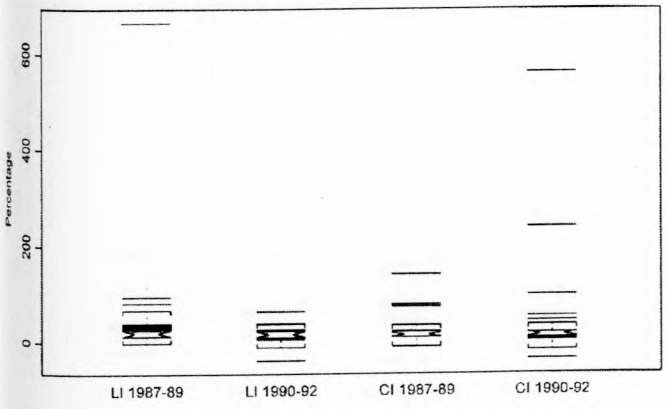

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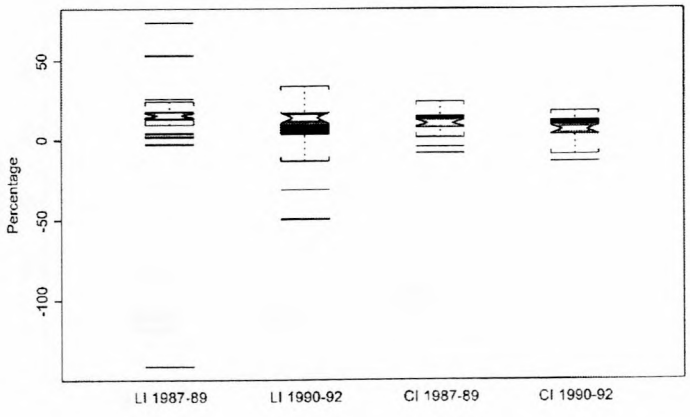

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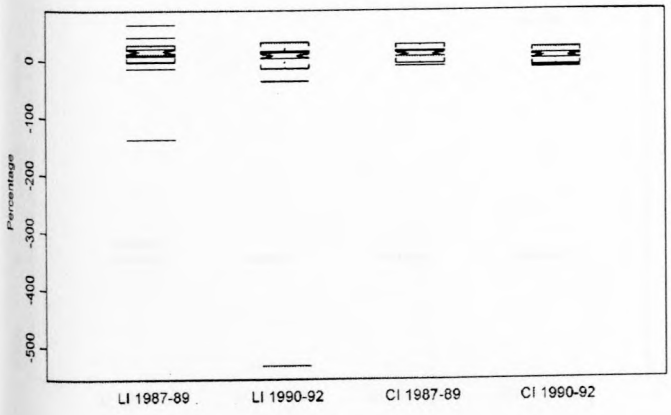

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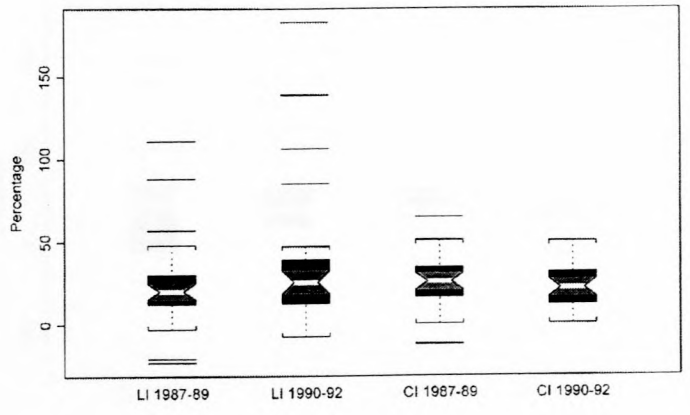

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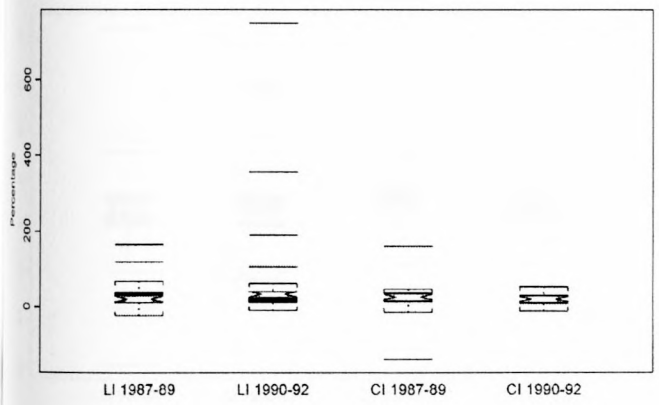

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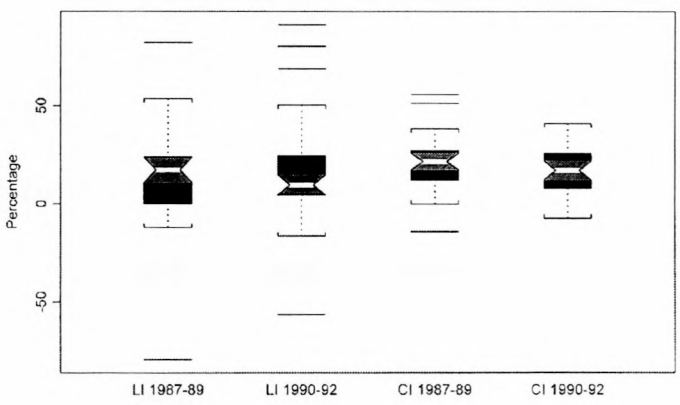

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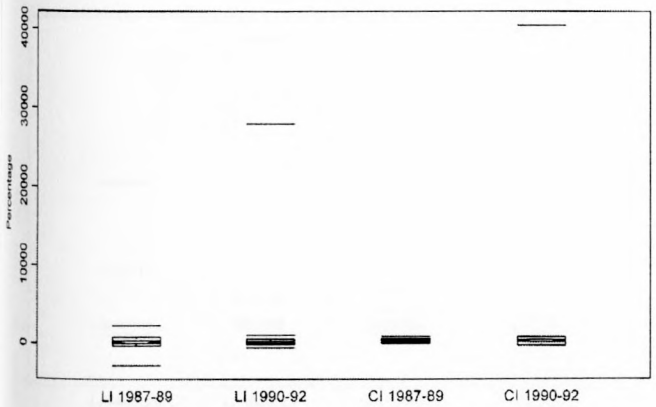

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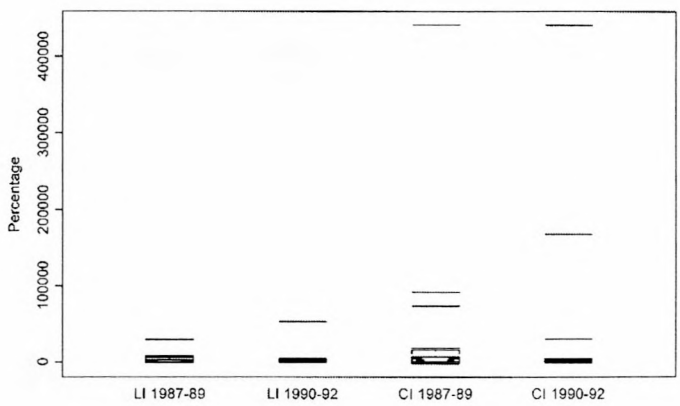

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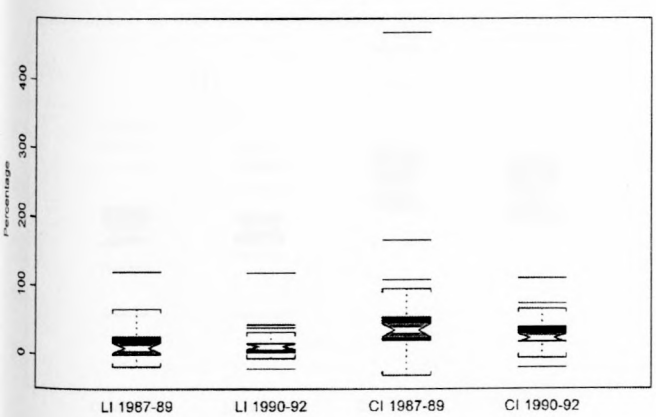

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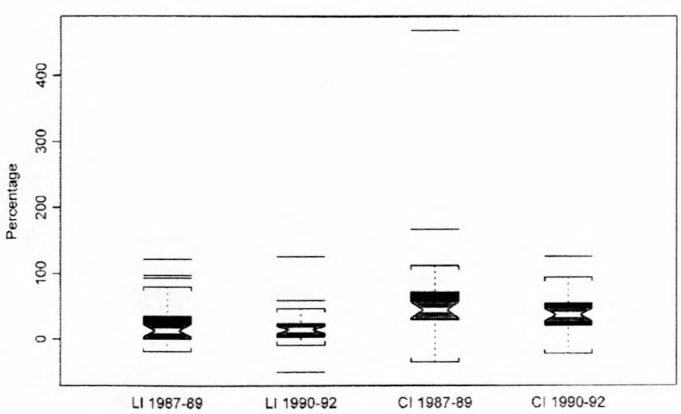

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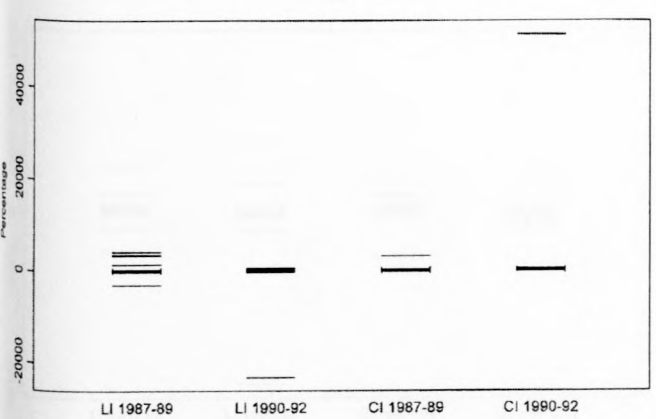

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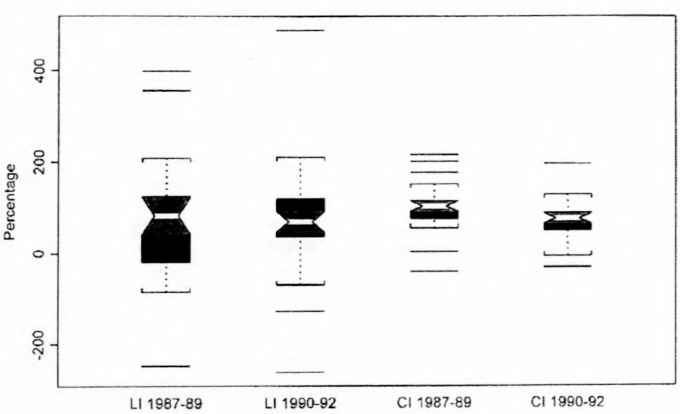

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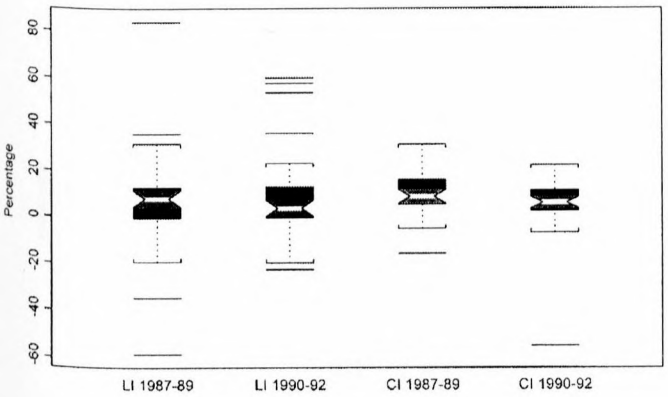

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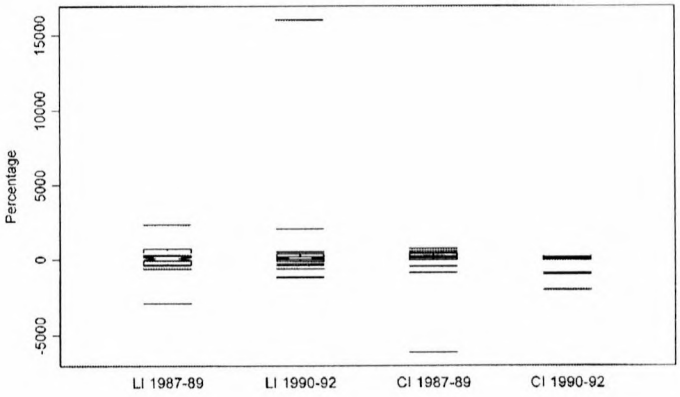

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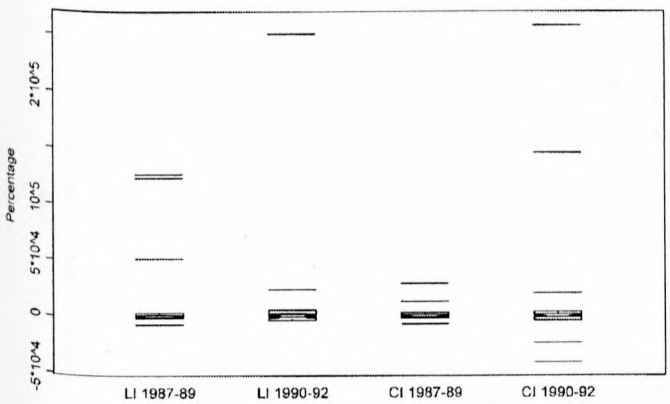

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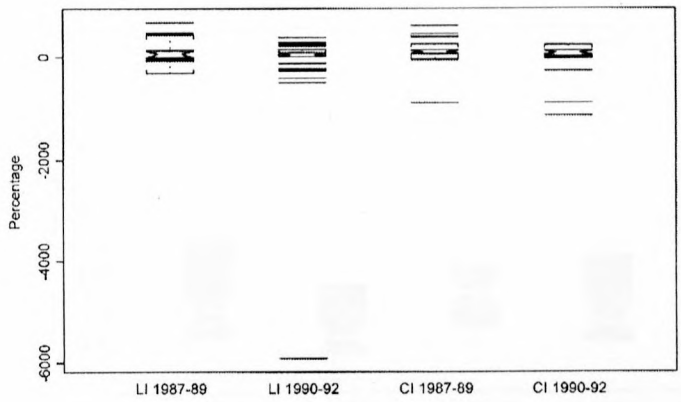

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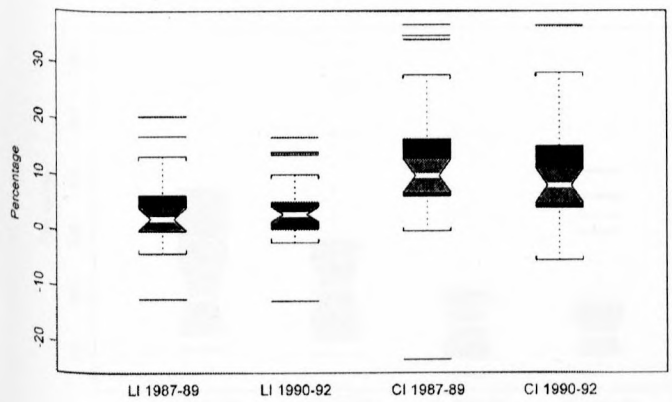

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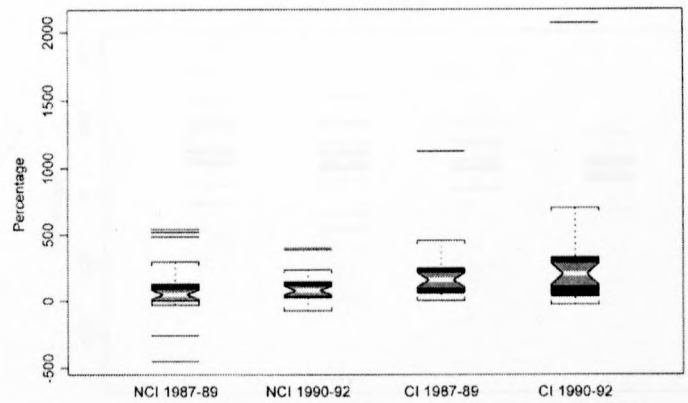

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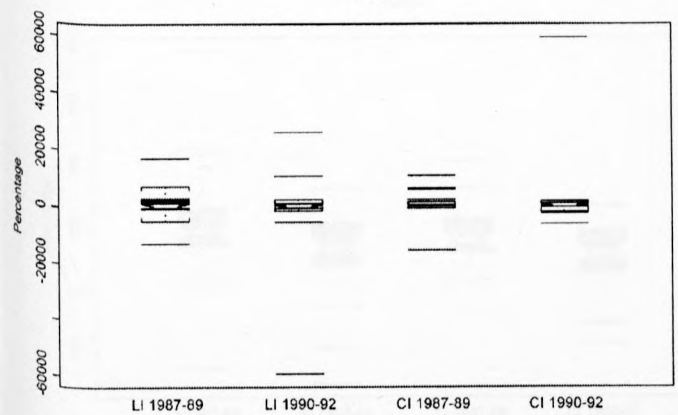

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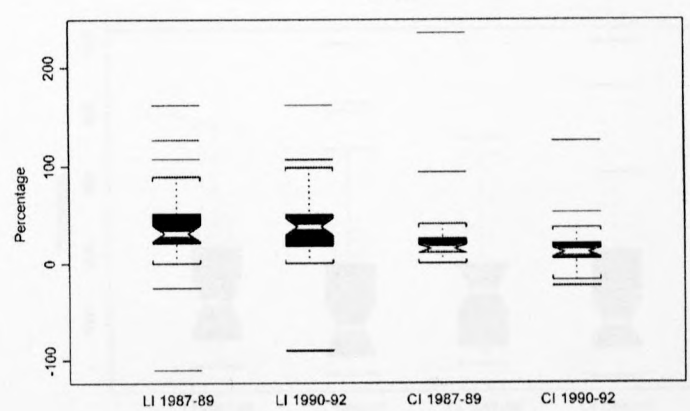

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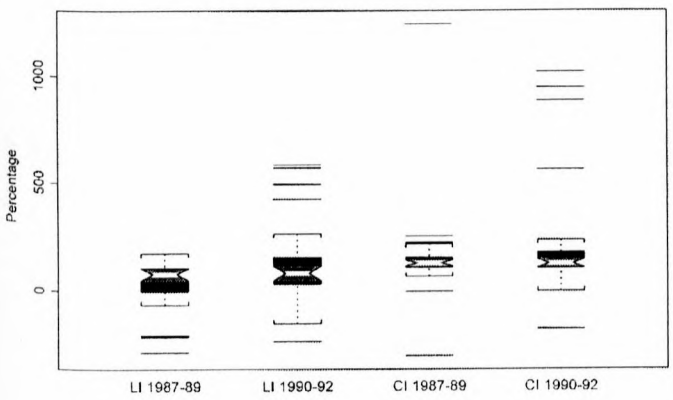

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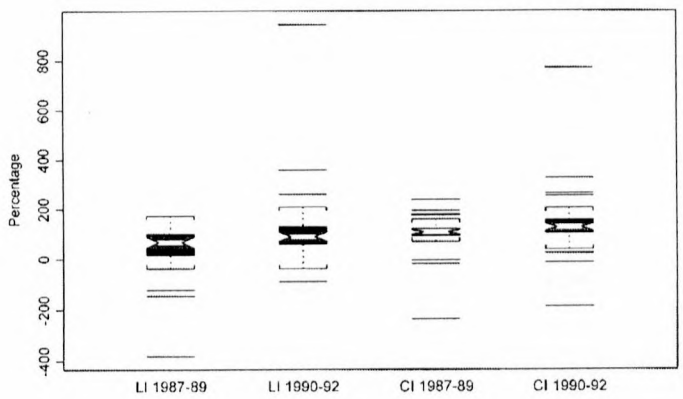

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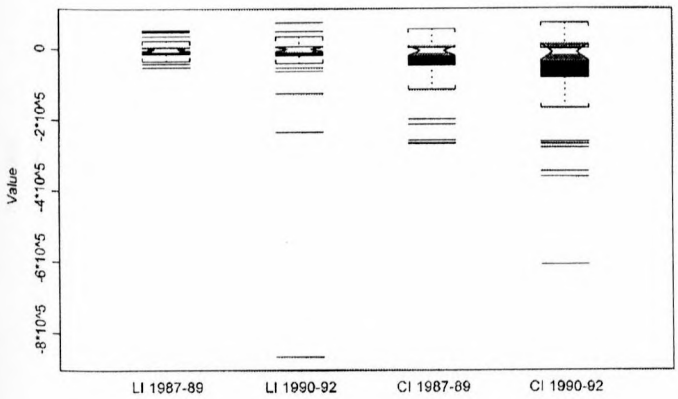

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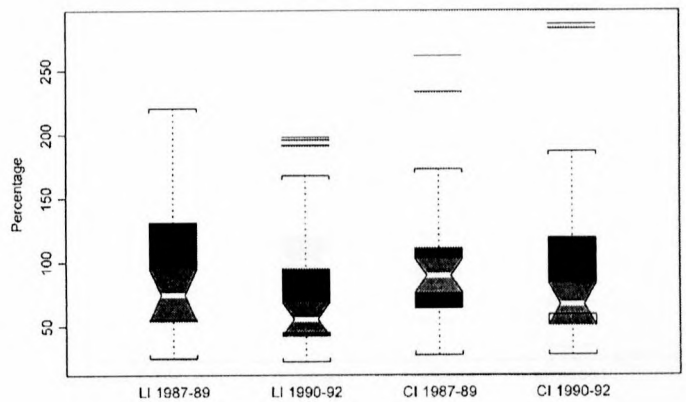

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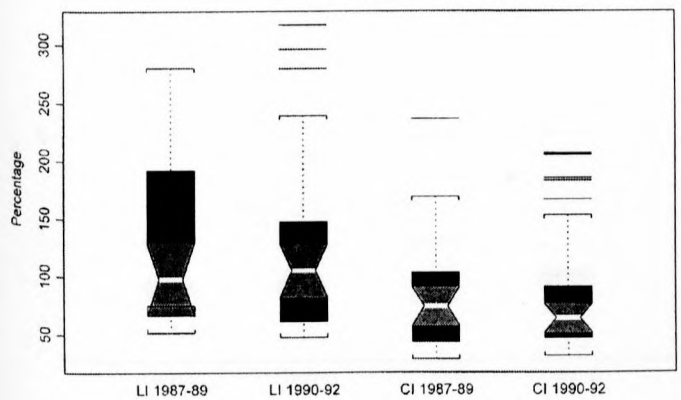

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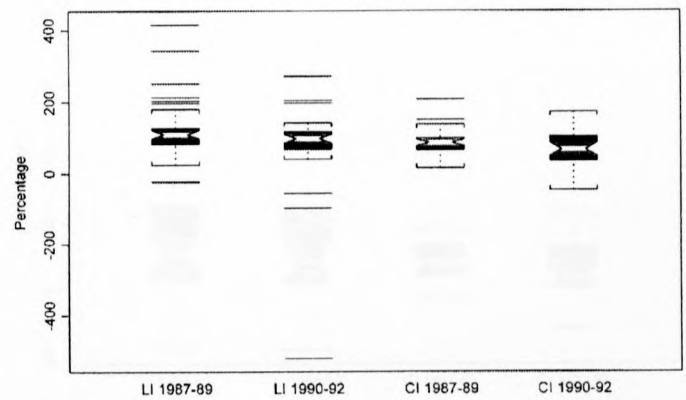

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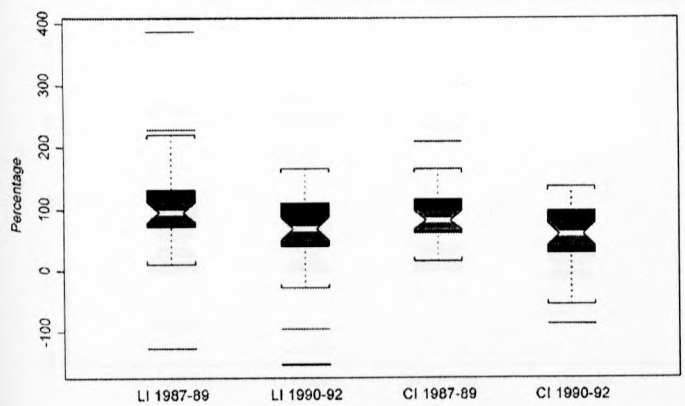

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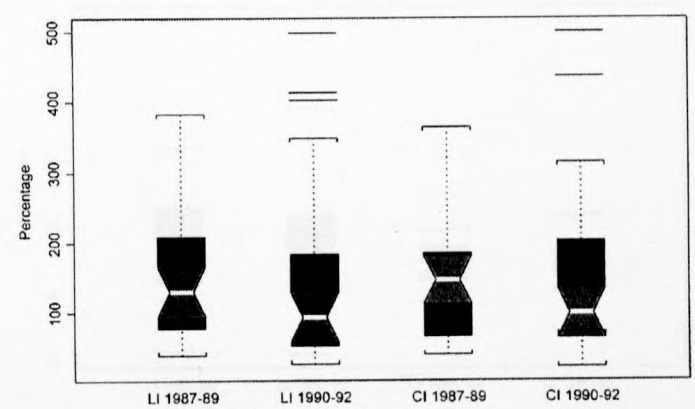

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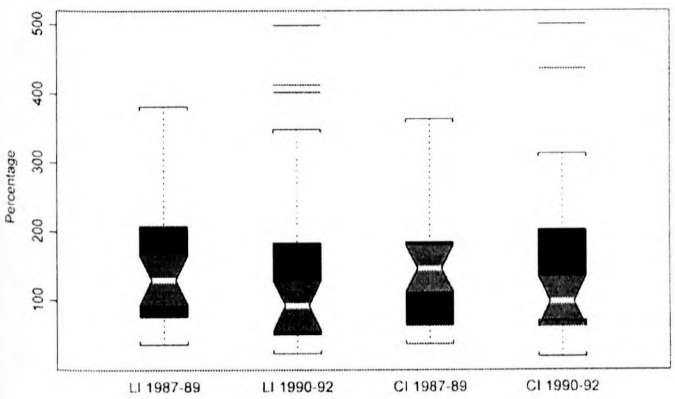

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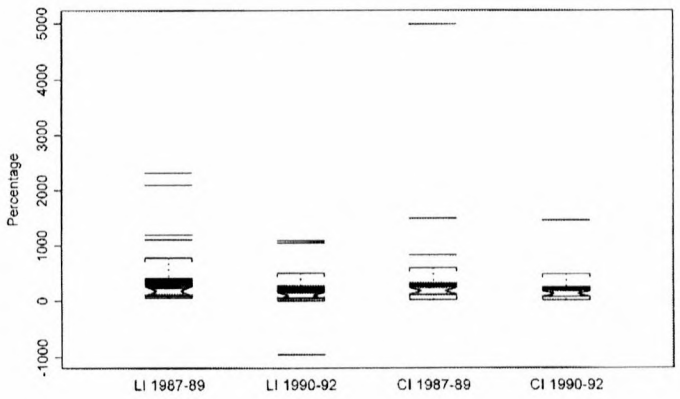

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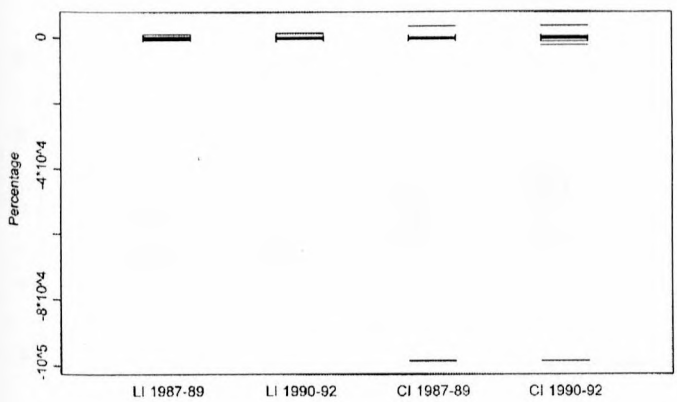

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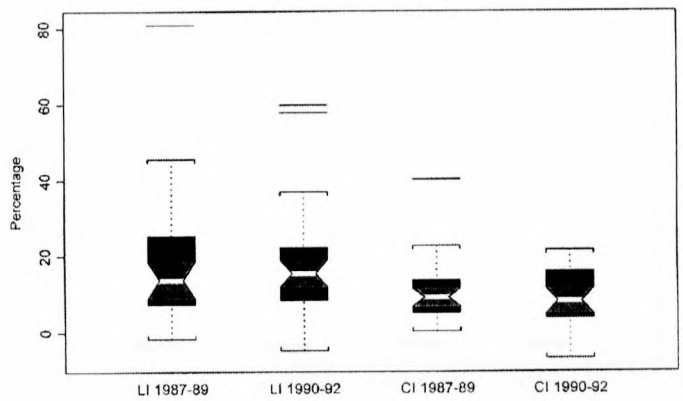

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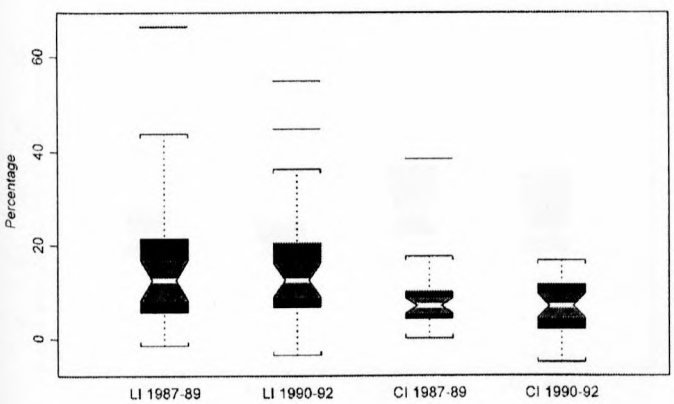

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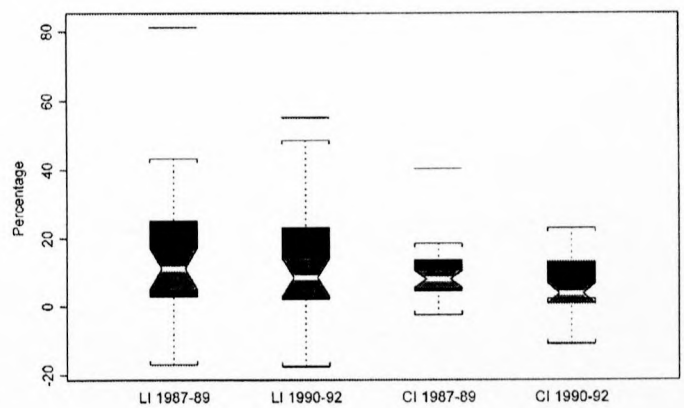

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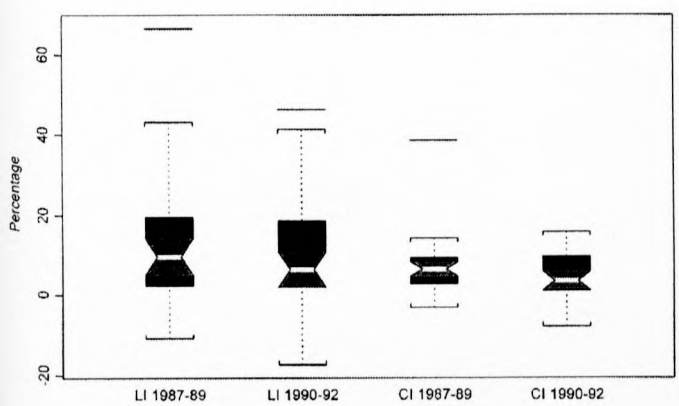

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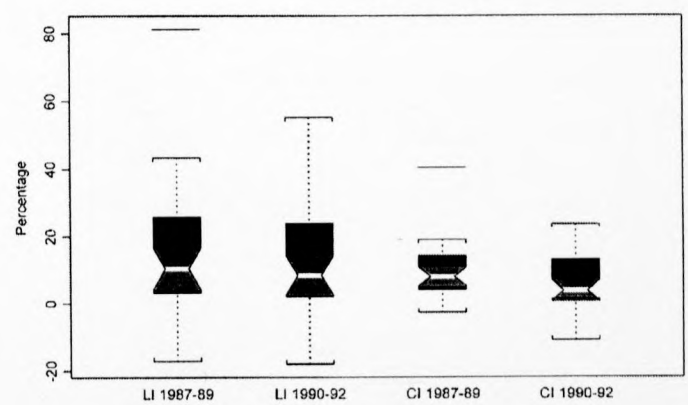

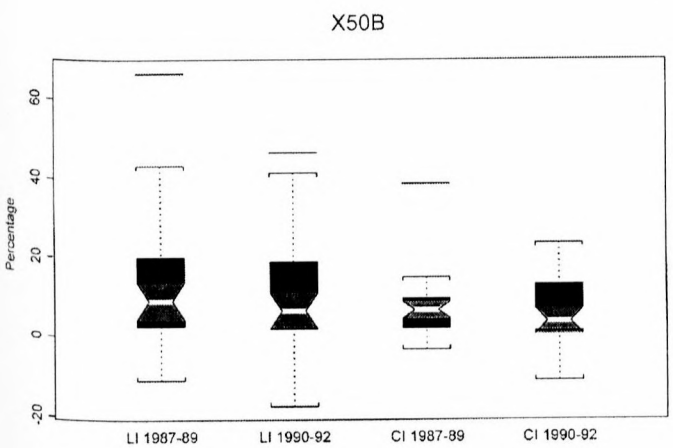
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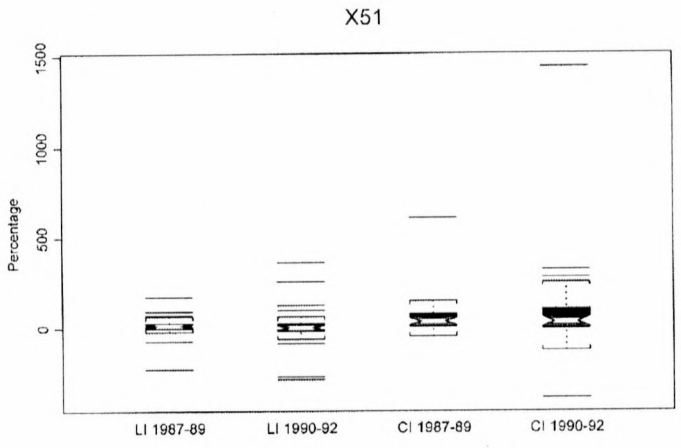
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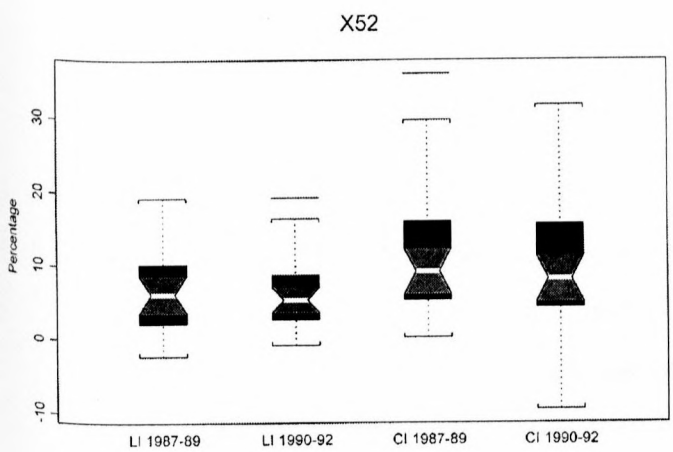
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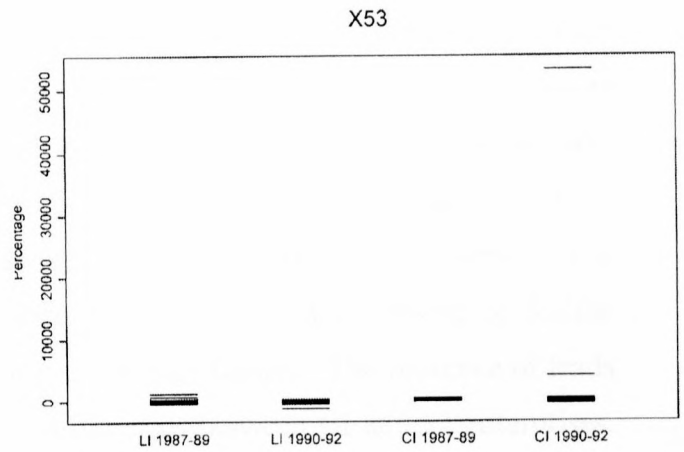
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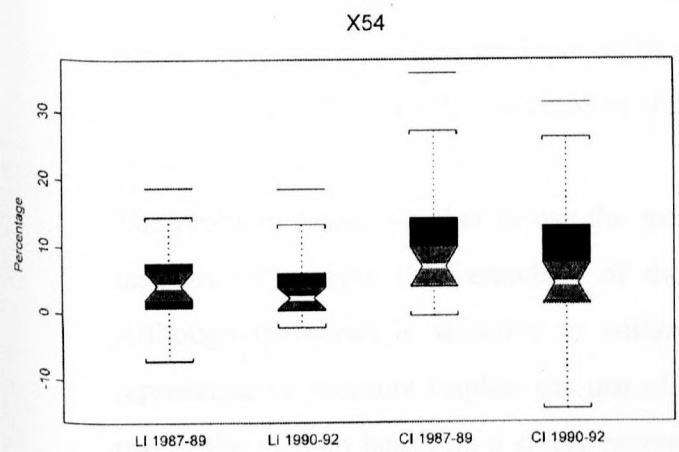
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CHAPTER 8

ANALYSIS OF THE BEHAVIOUR PATTERNS OF THE RATIOS FOR CAPITAL AND LABOUR INTENSIVE ENTERPRISES COVERING THE INDIVIDUAL YEARS OF THE ECONOMIC CYCLE

8.1 Introduction

The analysis of the ratios discussed in Chapter 7 was conducted using a mean as a single representative measure of an indicator's behaviour for the three-year upswing and three-year decline periods. However, the use of the mean is subject to certain limitations. For instance, the mean is sensitive to outlier values, which in this instance may distort the behaviour of the ratios for the CI or LI enterprises from the upswing to the decline phase. Furthermore, it is possible that either or both the CI and LI enterprises may lag or lead the upswing or decline phases, which is not visible from the use of three-year average figures. The presence of leads or lags among certain of the ratios may indicate differences between CI and LI enterprises. The lags effectively either lengthen or reduce the time frame of the two phases. It is also possible that the mean may be distorted by a few enterprises during any one of the three years, which would not be clearly indicated by the mean of a single representative measure.

The problem exists whether to use the mean or the median based on a single representative measure to analyse the behaviour of the ratios exhibited by the CI and LI enterprises. Although the mean is sensitive to outlier values, the use of the mean based on a single representative measure implies the use of all information contained in the data values. The use of the median based on a single representative measure results in the loss of information due to the selection of the middle value of a data series arranged in descending order; however, the median is not sensitive to outlier values. Furthermore, if the analysis is based on a single representative measure, it limits the extent to which significant mean or median trend patterns such as leads and lags exhibited by the CI and LI enterprises can be determined with any degree of certainty.

In the context of these shortcomings, a need arises to focus on the mean and median values of the individual years of the analysis for each ratio, which are based on the actual ratio values of the individual CI and LI enterprises. In addition a median plot compiled on an annual basis is used to complement the mean plot of each ratio and to indicate the presence of outliers in specific years of the analysis. Furthermore, the median is also used to identify possible lags or leads in the reaction of the CI and LI enterprises to an upswing and decline phase of the economic cycle. The analysis conducted in this chapter aims to refine, confirm and enhance the findings disseminated in previous chapters.

The following aspects are analysed when evaluating the annual mean and median of the CI and LI enterprises for each ratio:

- Outlier values
- Pattern in upswing and decline phases
- CI versus LI enterprises, i.e. higher or lower mean or median values over the period
- Lags and leads.

8.2 Analysis of the annual mean and median patterns for the CI and LI enterprises

The plots of the mean and median of the CI and LI enterprises for the individual years are used as the basis for the analysis of the patterns in this chapter. Some ratios for certain years appear to be reasonably normally distributed, while others are highly skewed with exceptionally large (in terms of absolute values) outliers. An initial indication of the presence of outliers among the CI and LI enterprises during any one of the individual years is obtained when the mean and median plots are compared. If outliers are present the mean may not be an acceptable measure for analysis and the median would therefore be a more relevant measure. By using the median, profile analysis using Hotelling's T^2 test is no longer valid (refer to Chapter 7 for a discussion of the procedural application of profile analysis). The use of non–parametric techniques to analyse median plots such as the Mann-Whitney U-test and Wilcoxon matched-pairs tests is more appropriate in these cases.

In addition, normalising data as some authors suggest with ratios is not applicable here, since normalising the data for different years destroys any year-to-year trend and differences

between years of importance in this study. Alternatively, the data may be transformed using a log transformation. The log transformation brings the larger and smaller values closer together and is only applicable to ratios which exhibit positive values. Unfortunately, many ratios also indicate negative values among the positive values, which precludes the use of a log transformation. In the cases where the outliers are successfully addressed by using the logarithm of the data, Hotelling's T^2 test is valid and it is possible to conduct a profile analysis. In addition, the results are useful since log values are easy to interpret.

A transformation of ratios consisting of positive and negative values is also attempted. The procedure involves the assignment of a zero value to the original values between -1 and $+1$ and taking the log of the absolute value of values outside the interval $[-1; +1]$. This value is assigned a negative sign if the original value is less than -1 and a positive sign if the original value is larger than $+1$. This procedure is useful in a limited number of cases depending on the distribution of the original values. The following problem occurs in other cases: the transformed values result in a bimodal distribution appearing to be a mixture of two normal distributions.

Furthermore, the presence of outliers is also addressed by visually investigating the scatterplots of the means for each year in an interactive manner. This is accomplished by using the "brush" functionality of the S-PLUS statistical software package in a manner which also enables the removal of data points considered visually to be outliers (S-PLUS, 1997). Mean patterns with the outlier values excluded are obtained, which are similar to the median profiles in a number of cases. In these cases it is possible to conduct a profile analysis based on Hotelling's T^2 test of the CI and LI profiles.

The outlier deletion procedures discussed above are complemented by an analysis of the variances of the respective ratios by considering their covariance matrices. The procedure involves analysing the size of the variances for the individual years of both the CI and LI enterprises prior to, and after the removal of the outliers. If the variances of the ratio, after the deletion of the outliers through one of the procedures discussed above, are of the same order over the total period, the adjusted mean (i.e. the mean after the removal of outlier values) is used.

If, however, the variance of the mean for a ratio is not of the same order for the individual years after the deletion of the identified outliers, the median is used as the measure to analyse the patterns exhibited by the CI and LI enterprises for a particular ratio.

It should be noted that several of the variables do not have a full complement of enterprise values for certain ratios. The lack of a sales figure or the non-payment of dividends are possible reasons for a lower number of data points in a ratio prior to the removal of outliers. In those cases where a large number of outlier data values are removed, over and above an already reduced number of values for a ratio, the validity of the conclusions obtained by examining the patterns of the ratio for either or both the CI and LI enterprises could possibly be questioned. A large number of the ratios required the removal of between two and fifteen outliers. The analysis in the following sections is primarily based on either the adjusted mean or median patterns.

8.2.1 Classification of the indicators by type of pattern

From the results of the ratios obtained after the application of the procedure discussed in the previous section, it is possible to categorise the mean, adjusted mean or median patterns as one of five different groups of patterns. The patterns are discussed in the following section with a broad description of each type. A total of 57 ratios included in the study are analysed in this chapter. The five ratios are excluded on the basis of a low number of valid data points.

The classification of the ratios per pattern group is based on an analysis of the graphic illustrations of the mean (all values in the data set), adjusted mean (with outliers removed) and median patterns exhibited by the CI and LI enterprises for each ratio from the upswing to the decline phase for the annual years. It is also based on, among other things, the application of the aspects mentioned in section 8.2. The patterns classified as types one to five apply to both the CI and LI enterprises.

- **Type 1: Normal expected patterns**

The normal behaviour of a ratio exhibits two types of patterns, which are expected from a financial management perspective. Figure 8.1 illustrates an increasing (Graph A) and decreasing (Graph B) normal expected pattern for the CI and LI enterprises.

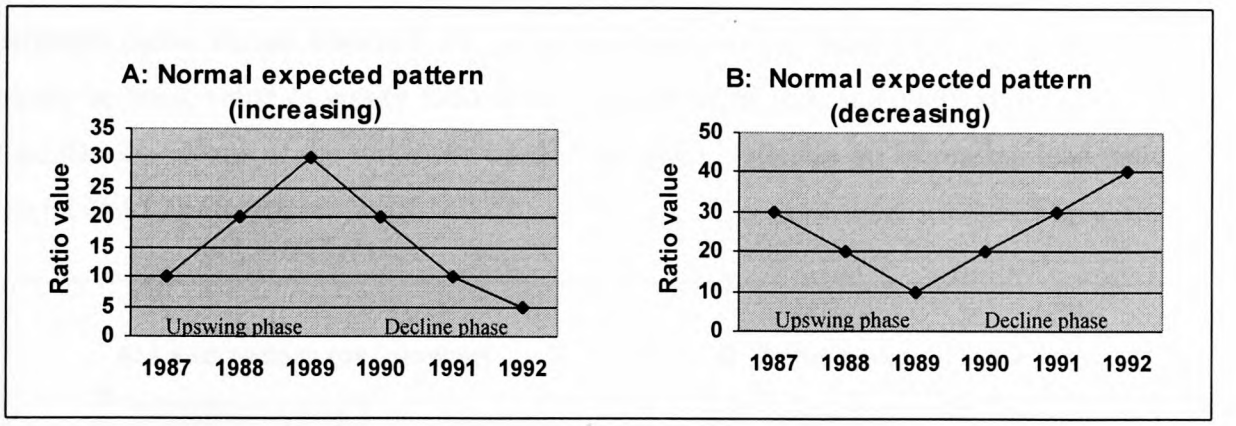

Figure 8.1: A graphic illustration of increasing (A) and decreasing (B) normal expected patterns exhibited by CI and LI enterprises for a specific financial ratio

Graph A indicates an increasing trend pattern during the upswing phase (1987 to 1989) and a decreasing trend pattern during the decline phase (1990 to 1992). The mean or median values are higher than the previous year during the upswing phase and lower than the previous year during the decline phase. Graph B indicates an opposite pattern to the pattern exhibited by Graph A. An increasing pattern is indicated during the upswing phase for Graph A, while a decreasing pattern is indicated during the upswing phase for Graph B. For example, the return on total net assets exhibits an increasing trend during the upswing period and a decreasing pattern during the decline period for the CI and LI enterprises. No ratios included in the study indicate a decreasing normal expected pattern.

- **Type 2: Lead patterns**

A lead pattern, which is exhibited by both CI and LI enterprises, may occur with two variations. Figure 8.2 is an illustration of two graphs, A and B, that indicate increasing and decreasing lead patterns respectively.

Graph A in Figure 8.2 indicates the lead during the upswing phase and continuing into the decline phase. It is possible that both CI and LI enterprises anticipate the decline in the economic cycle. Lower mean or median values are prevalent in the third year of the upswing phase, which indicates the formation of the lead pattern. The lead originates with an upward pattern during the upswing phase that increases progressively into the decline phase (see Graph B). The mean values in this instance increase in the third year of the upswing phase.

Both Graphs A and B would indicate varying lead patterns for the CI and LI enterprises due to different mean values obtained for individual years of the analysis. The market value of equity to book value of equity ratio is an example of an indicator that exhibits a decreasing lead pattern. None of the ratios included in the study indicates an increasing lead pattern for the CI and LI enterprises.

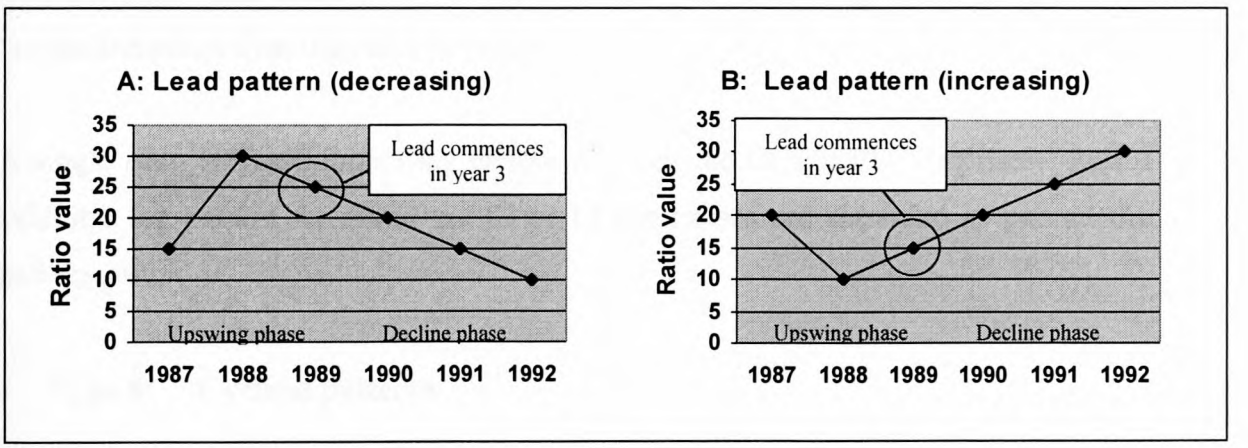

Figure 8.2: A graphic illustration of decreasing (A) and increasing (B) lead patterns exhibited by CI and LI enterprises for a specific financial ratio

- **Type 3: Lag patterns**

CI and LI enterprises could exhibit two types of lagged mean or median patterns. Figure 8.3 is an illustration of increasing (Graph A) and decreasing (Graph B) lag mean or median patterns.

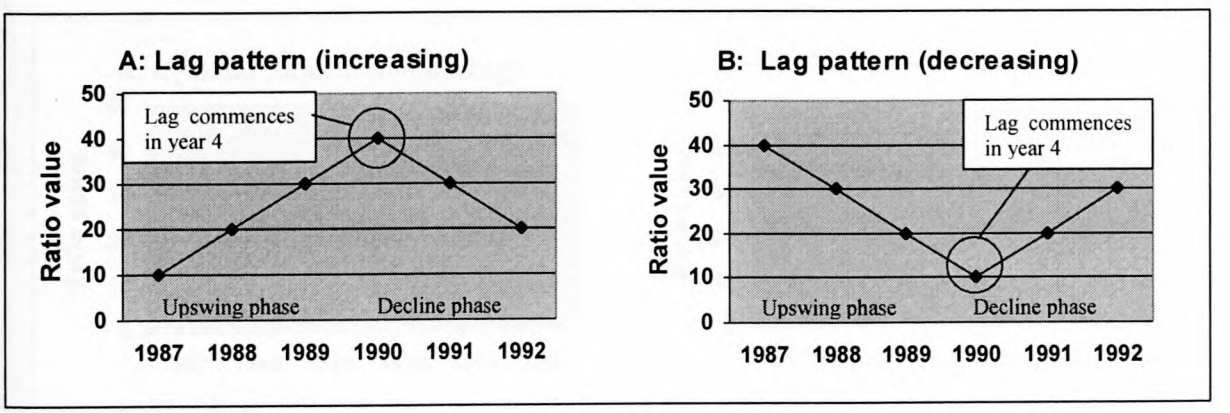

Figure 8.3: A graphic illustration of increasing (A) and decreasing (B) lag patterns exhibited by CI and LI enterprises for a particular financial ratio

The increasing lag pattern (Graph A) is characterised by an extended increase in the upswing phase into the decline phase. This causes a delay in the response of the CI and LI enterprises to a downswing in the economy. It is also possible that the increasing lag may extend further into the decline phase than the one-year lag exhibited in Graph A. Graph B indicates a decreasing lag pattern with the lag extending into the decline phase, but from a downswing during the upswing phase. It is also possible that the decreasing lag may extend further into the decline phase than indicated in Graph B.

A single ratio DPS exhibits a lag pattern for both the CI and LI enterprises. Ratios which exhibit a lag pattern for either the CI or LI enterprises are classified as part of the mixed pattern group.

- **Type 4: Cyclical patterns**

Ratios that exhibit cyclical patterns for the CI and LI enterprises indicate no distinct pattern during either or both the upswing and decline phase. Apparent upward and downward movements occur within the upswing and decline period, which clearly indicates large variation among the CI and LI enterprises. For the purpose of this analysis a cyclical mean or median pattern occurs when both the CI or LI enterprises indicate an upward or downward pattern that continues for a maximum of two years before a following upswing or decline period commences. Figure 8.4 illustrates two examples (Graphs A and B) of increasing and decreasing cyclical patterns respectively.

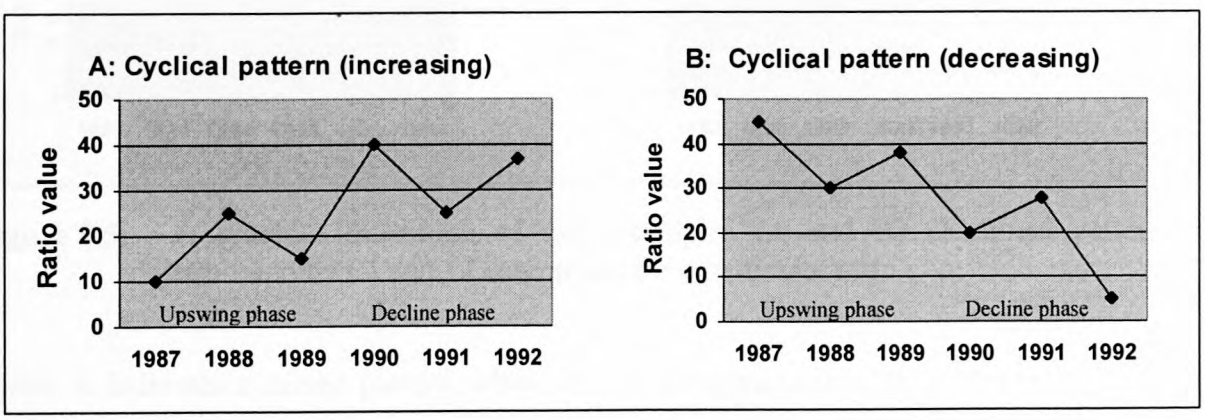

Figure 8.4: A graphic illustration of cyclical increasing (A) and decreasing (B) patterns exhibited by CI and LI enterprises for a specific financial ratio

Graph A indicates a general increasing cyclical pattern which is characterised by increasing and decreasing mean or median values during both the upswing and decline phase. It is clear that the general trend of the pattern over the total period is increasing. The decreasing cyclical pattern is characterised by an initial downswing during the upswing phase followed by annual increases and decreases over the remaining period as indicated in Graph B. The nature of the ratio and its sensitivity to an upswing or decline would determine the extent of the cyclical movements of the CI and LI enterprises. A single ratio, the market price per share to cash flow per share, is an example of a combination between an increasing and decreasing cyclical pattern.

- **Type 5: Mixed patterns**

A mixed pattern refers to instances when the CI and LI enterprises exhibit different types of patterns for a particular ratio. For instance, a CI enterprise may resemble a normal expected pattern, while the LI enterprises may indicate a lag pattern of the mean or median. From a financial management perspective these patterns could provide an interesting interpretation as the CI and LI enterprises react differently to changes in the economic cycle. Figure 8.5 exhibits two examples (Graphs A and B) of pattern combinations for CI and LI enterprises.

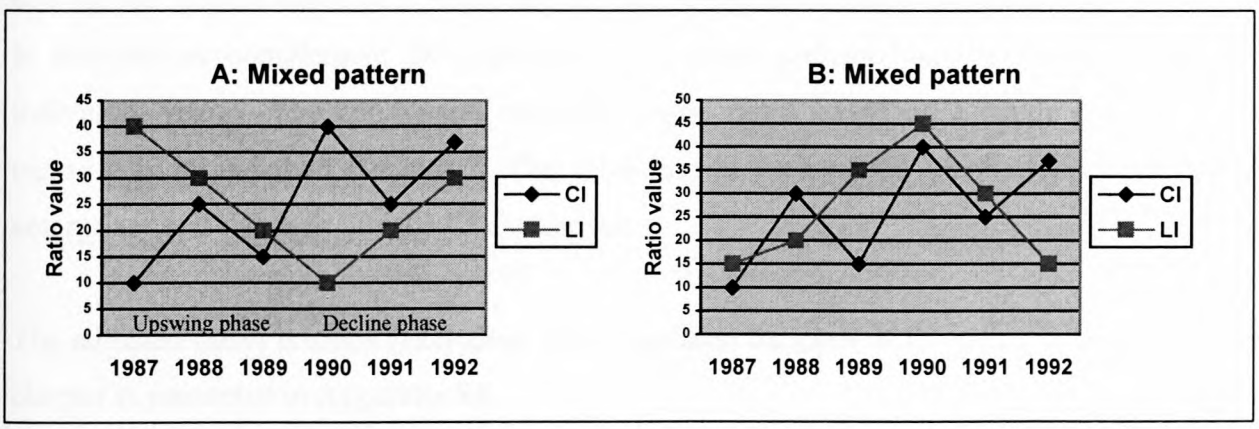

Figure 8.5: A graphic illustration of two examples (A and B) of mixed patterns as exhibited by CI and LI enterprises for a particular ratio

Graph A indicates a mixed pattern, where the CI enterprises indicate an increasing cyclical pattern and the LI enterprises a decreasing lag pattern. Graph B indicates a decreasing cyclical and increasing lag pattern for the CI and LI enterprises respectively. For instance, the EPS ratio is an example of an indicator from the profitability group that exhibits a mixed pattern. The CI enterprises indicate a lead pattern and the LI enterprises a lag pattern.

8.3 Analysis of indicators which exhibit normal expected mean, adjusted mean or median patterns for the CI and LI enterprises

8.3.1 Illustration of the graphic representations used to analyse the ratio patterns

In the following section each of the ratios is categorised as one of the previously described pattern types. An example of a ratio which typically illustrates the type of pattern within each of the categories is also provided. A total of four graphic representations are provided for each grouping of ratio patterns. Figure 8.6 is used as an example for the purposes of explanation. The graphs on the left of Figure 8.6 are based on a single representative measure and are indicated as a single mean and median value for the CI and LI enterprises during the upswing and decline phase. The graph at the top left is compiled from a mean value based on a single representative measure, while the graph at the bottom left is compiled from a median value based on a single representative measure. The graphs on the right of Figure 8.6 represent the mean (top right) and median (bottom right) values calculated for the individual years of the analysis for the CI and LI enterprises. These graphs are used for the analysis of the ratio patterns exhibited by the CI and LI enterprises in this chapter. Reference to the mean and median graphs based on a single representative measure (graphs on the left of Figure 8.6) is intended to complement the analysis of the mean and median patterns based on the individual years. The behavioural analysis of the ratios based on a single representative measure is provided in Chapter 7. The solid line in each of the graphs represents the LI enterprises and the dash line the CI enterprises.

The adjusted mean profiles (excluding visual outliers) for each of the ratios discussed in this chapter is presented in Appendix 8B.

8.3.2 Statistical analysis of ratio patterns

Return on total net assets before tax (RONA) is an example of an indicator that exhibits a pattern with increasing mean values during the upswing phase and declining values for the decline phase. Figure 8.6 is an illustration of RONA, which exhibits an increasing normal expected mean and median pattern for the CI and LI enterprises.

Figure 8.6 indicates that both the CI and LI enterprises exhibit increasing mean and median patterns during the upswing phase and decreasing mean patterns during the decline phase of the individual years of the analysis. The mean and median patterns based on a single representative measure also indicate declining patterns, which is to be expected. Perusal of the covariance matrices of the ratio (see Appendix 8A) indicates that the variation among the individual years of the analysis between the matrices based on the total data set and the matrices based on the mean after the removal of outlier values does not appear to be substantial (see Appendix 8B).

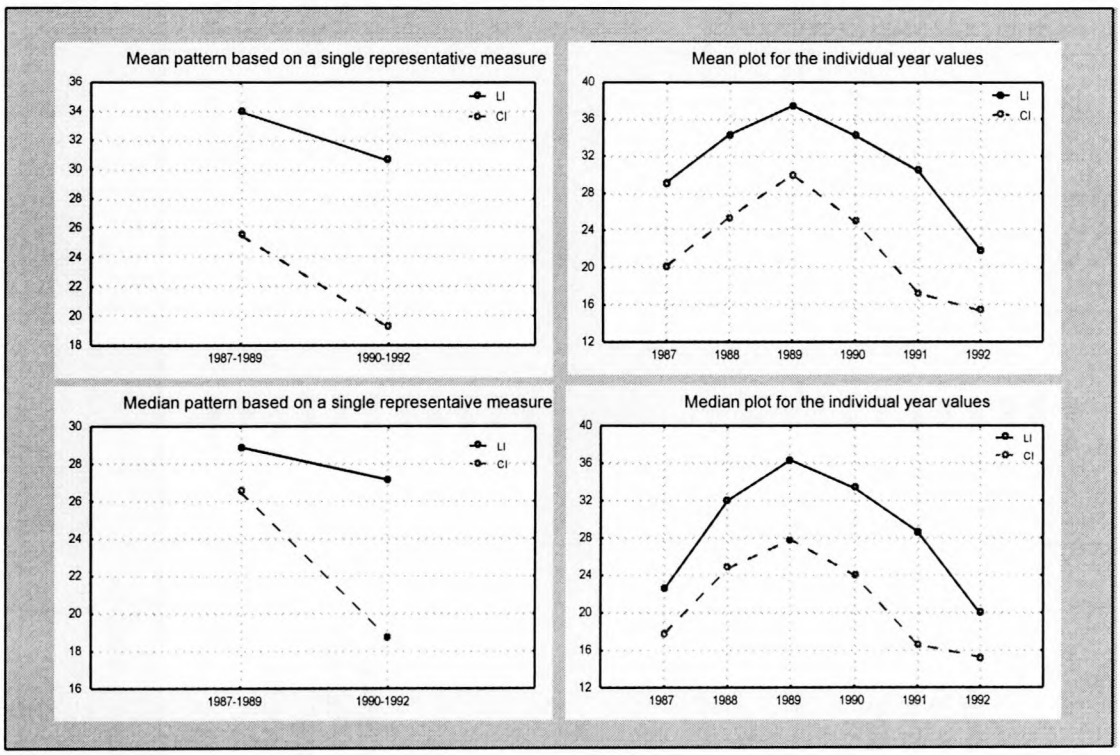

Figure 8.6: An illustration of an increasing normal expected mean and median pattern of both the CI and LI enterprises for return on total net assets

The LI enterprises have larger means than the CI enterprises. A profile analysis of the mean based on the CI and LI profiles also indicates that the profiles are parallel (p=0,8745) and, as a consequence, it is possible to determine that the mean profile of the LI enterprises is statistically significantly higher than the mean profile of the CI enterprises (p=0,0107), i.e. the profiles are not coincident.

Table 8.1 indicates the ratios per category which exhibit increasing and decreasing normal expected patterns.

Table 8.1: Classification of ratios per category that exhibit increasing and decreasing normal expected patterns

Type of pattern	TYPE [1] PATTERN Normal expected mean, adjusted mean or median pattern for both CI and LI enterprises	Mean, adjusted mean or median pattern*	Status **	p-values ***	N before outlier deletion****	N after outlier deletion****
Profit-ability [12]	Return on total net assets before tax (RONA)	Mean	LI	0,0107	[LI, 33];[CI, 32]	[LI, 31];[CI, 31]
	Return on total net assets after tax ($RONA_{1-t}$)	Mean	LI	0,0647	[LI, 33];[CI, 32]	[LI, 30];[CI, 31]
	Return on total shareholders' interest before tax (ROE)	Mean	LI	0,1100	[LI, 33];[CI, 32]	[LI, 27];[CI, 32]
	Return on total shareholders' interest after tax (ROE_{1-t})	Mean	LI	0,0721	[LI, 33];[CI, 32]	[LI, 27];[CI, 32]
	Return on ordinary shareholders' interest before tax (ROSE)	Mean	LI	0,0523	[LI, 33];[CI, 32]	[LI, 28];[CI, 32]
	Return on ordinary shareholders' interest after tax ($ROSE_{1-t}$)	Mean	LI	0,0423	[LI, 27];[CI, 32]	[LI, 27];[CI, 32]
	Return on net operating assets before tax (RNOA)	Mean	LI	0,0028	[LI, 33];[CI, 32]	[LI, 30];[CI, 31]
	Return on net operating assets after tax ($RNOA_{1-t}$)	Mean	LI	0,0318	[LI, 33];[CI, 32]	[LI, 29];[CI, 31]
	Return on sales before tax (ROS)	Mean	CI	0,0027	[LI, 24];[CI, 30]	[LI, 22];[CI, 28]
	Return on sales after tax (ROS_{1-t})	Mean	CI	0,0082	[LI, 24];[CI, 30]	[LI, 22];[CI, 27]
	Net income margin before tax (NIM)	Mean	CI	0,0076	[LI, 24];[CI, 30]	[LI, 21];[CI, 28]
	Turnover to total net assets (TURN:TNA)	Mean	LI	N/A	[LI, 24];[CI, 30]	[LI, 23];[CI, 27]
Growth [2]	Internal growth rate after tax (IGR_{1-t})	Median	LI	N/A	[LI, 33];[CI, 32]	[LI, 30];[CI, 32]
	Sustainable growth rate after tax (SGR_{1-t})	Mean	LI	0,0356	[LI, 33];[CI, 32]	[LI, 33];[CI, 32]
Cash flow [0]	NONE					
Value [3]	Economic value added (EVA)	Median	LI	N/A	[LI, 33];[CI, 32]	[LI, 31];[CI, 27]
	Profitability index: capital spread (RONA:WACC)	Mean	LI	0,0138	[LI, 33];[CI, 32]	[LI, 24];[CI, 32]
	Profitability index: equity spread ($ROE:K_e$)	Mean	LI	0,0540	[LI, 33];[CI, 32]	[LI, 25];[CI, 31]
Inflation adjusted [9]	Return on total net assets before tax ($RONA_{real5}$)	Mean	LI	0,0042	[LI, 33];[CI, 32]	[LI, 33];[CI, 32]
	Return on total net assets before tax ($RONA_{real10}$)	Mean	LI	0,0038	[LI, 33];[CI, 32]	[LI, 33];[CI, 32]
	Return on total shareholders' interest before tax (ROE_{real5})	Mean	LI	0,0564	[LI, 33];[CI, 32]	[LI, 23];[CI, 30]
	Return on total shareholders' interest before tax (ROE_{real10})	Mean	LI	0,0525	[LI, 33];[CI, 32]	[LI, 21];[CI, 30]
	Return on ordinary shareholders' interest before tax ($ROSE_{real5}$)	Mean	LI	0,1358	[LI, 33];[CI, 32]	[LI, 22];[CI, 30]
	Return on ordinary shareholders' interest before tax ($ROSE_{real10}$)	Mean	LI	0,1343	[LI, 33];[CI, 32]	[LI, 22];[CI, 30]
	Earnings per share (EPS_{real})	Mean	CI	0,0815	[LI, 33];[CI, 32]	[LI, 31];[CI, 30]
	Return on sales (ROS_{real})	Mean	CI	0,0390	[LI, 24];[CI, 30]	[LI, 22];[CI, 28]
	Net income margin (NIM_{real})	Mean	CI	0,0622	[LI, 24];[CI, 30]	[LI, 21];[CI, 24]

Note: X12, X19, X27, X31, X53 are excluded from the analysis due to a low number of valid data points (see explanation in Chapter 6)

* Indicates whether the mean, adjusted mean or median is used in the analysis. If the mean/adjusted mean is indicated, the mean and median profiles are similar and a profile analysis of the CI and LI profiles is possible. If the median is indicated, the adjusted mean and median differ due to variation among the enterprises as indicated by the covariance matrix of the ratio. The median patterns of the CI and LI enterprises are then used for financial analysis and interpretation. The term "mean" refers to the adjusted mean, unless otherwise stated.

** Indicates whether the CI or LI enterprises have higher mean/adjusted mean or median values over the entire period.

*** If a profile analysis is possible (see type of pattern), it is possible to determine whether or not the CI and LI profiles are parallel. If the profiles are parallel, it is possible to determine whether or not the CI and LI profiles are coincident. In the table p-values are provided for the relevant ratios to indicate whether or not the CI profile is at a statistically significantly higher level than the LI profile, or vice versa, on the acceptance of parallelism. If the CI and LI profiles are not parallel or the median is used for the purposes of pattern recognition, a N/A is indicated. A 5% significance level is used to determine statistically significant differences between the CI and LI profiles.

**** The figures in parenthesis indicate the number of data values before and after the exclusion of identified outlier points.
An assessment of the number of valid data points originally included in the analysis indicates that it is not necessary to delete a large number of data points considered to be outliers. For instance, the table indicates that the inflation-adjusted ratios $ROE_{\text{real 5 and 10}}$ and the $ROSE_{\text{real 5 and 10}}$ exhibit a large number of outliers among the LI enterprises. Among the CI enterprises an insignificant number of outliers need to be discarded. The NIM_{real} is the only ratio that indicates the loss of six enterprises that may be considered to be outlier values.

Table 8.1 indicates that 26 (46%) of the 57 financial ratios used in the analysis exhibit expected increasing and decreasing normal adjusted mean or median patterns. All these ratios indicate increasing normal expected patterns. Of the 26 ratios, 12 are classified as profitability, two growth, three value, nine inflation-adjusted indicators, while no cash flow ratios indicate normal expected patterns. The analysis of the indicators is based on the adjusted mean in 24 of the cases after removal of several outlier values. The use of the median is only required in two cases where neither the mean nor the adjusted mean are suitable measures to use for purposes of pattern recognition.

The LI enterprises have higher mean or median values over the total period for 20 of the 26 ratios that exhibit adjusted mean or median patterns. All 20 ratios are expected to have higher mean and median values for the LI enterprises than for the CI enterprises. The finding indicates that the profitability is generally higher for the LI enterprises than for the CI enterprises over the upswing and decline in the economic cycle. This is mainly due to higher turnover ratios for the LI enterprises due to lower income margins, which result in higher sales and subsequently higher income. Of those ratios (six) which indicate a higher mean or median value for the CI enterprises over the LI enterprises, five exhibit expected patterns, i.e. CI enterprises should have higher income margins than the LI enterprises because of their lower turnover ratios.

The profile analysis results indicate that the values of 12 ratios exhibit a significant difference between the levels of the CI and LI profiles (see p-values in Table 8.1), i.e. the CI and LI profiles are not coincident. For eight of the ratios the LI profiles are at a statistically significantly higher level than the CI profiles, while the remaining four ratios indicate that the CI profiles are at a statistically significantly higher level than the LI profiles over the total period. Furthermore, 11 of the ratios (nine LI and two CI profiles) indicate no statistically significant differences between the levels of the CI and LI profiles over the total period. A profile analysis is not applicable to three of the remaining three ratios due to the use of the median for the purpose of pattern recognition. Only the sales to total net assets ratio indicates that the CI and LI profiles are not parallel and therefore it is not possible to determine whether or not the CI and LI profiles are coincident.

The findings highlight several interesting aspects. These aspects are interpreted from a financial management perspective in the following section. Only the more important

traditional ratios highlighted in Table 8.1 will be considered as part of the financial interpretation of the findings.

8.3.3 Financial interpretation of results

Although all the ratios in the profitability category indicate the use of the adjusted mean for pattern recognition. A total of three ratios (ROS, ROS_{1-t}, NIM) indicate statistically significantly higher CI profiles than the LI profiles over the total period. All three ratios are based on sales, which clearly emphasises that CI enterprises normally have higher income margins, which compensates for lower turnover ratios. A similar result is obtained for the ROS adjusted for inflation. This is expected as the ROS for the CI enterprises would be expected to be high due to higher margins, while the ROS for the LI enterprises would be expected to be lower due to lower margins. The TURN:TNA ratio indicates that the turnover increases at a faster rate than the assets among the LI enterprises than the CI enterprises. This is also a possible reason for the higher LI profile than the CI profile over the total period, although the profiles are not parallel. However, higher margins obtained among the CI enterprises account for a larger turnover, but this is also coupled to a possible higher requirement for fixed assets and therefore indicates a lower ratio than LI enterprises.

The NIM ratio also indicates that the effect of inflation on the income of an enterprise could be considered as the levelling factor between CI and LI enterprises. This is substantiated from the statistically significant difference between the CI and LI profiles for the NIM expressed in monetary terms and the non-significant differences between the profiles of the two groups if the real NIM is considered (see Table 8.1). CI enterprises are more prone to inflation due to higher levels of fixed assets and are therefore subject to larger depreciation write-off in periods of high inflation.

EPS in real terms exhibits an increasing normal expected pattern obtained from a log transformation of the ratio values for the CI and LI enterprises, while in monetary terms the EPS of the CI and LI enterprises indicates a mixed pattern. The CI enterprises indicate a lag and the LI enterprises a lead pattern.

The ratios RONA and ROSE before and after tax highlight differences in the level of the ratios for the LI enterprises in relation to the ratios for the CI enterprises over the total period.

The before-tax figure for the RONA ratio indicates that the LI enterprises are at a significantly higher level than the CI enterprises, while the after-tax figure suggests that the difference in the level between CI and LI enterprises is not as substantial. This may possibly be attributed to a lower effective tax rate payable by CI enterprises resulting from additional rebates not applicable to LI enterprises. For $ROSE_{1-t}$, the LI enterprises are at a statistically significantly higher level than the CI enterprises, while the profile of the ROSE before tax suggests that the LI enterprises are not at a substantially higher level than the CI enterprises over the total economic period. This finding is also relevant for the $ROSE_{real5}$ and $ROSE_{real10}$ indicators.

8.3.4 Summary of findings

The findings discussed previously indicate that approximately 46% of the ratios are expected to follow the trade cycle, i.e. during the upswing an increase in the ratio occurs and the ratio decreases during the decline phase. Many of the traditional profitability measures of financial performance such as RONA, ROE, RNOA and value indicators such as EVA follow the trade cycle. These results are expected and consequently not many conclusions could be drawn from the patterns. This may be attributed to the composition of the ratios, which are based on assets or components of assets that do not fluctuate significantly from year to year due to the historic cost basis for the valuation of the assets. LI enterprises have mostly higher ratio values than a CI enterprise due to the higher turnover ratios and lower income margins among LI enterprises and higher income margins and lower turnover ratios among the CI enterprises.

8.4 Analysis of indicators which exhibit increasing and decreasing lag mean, adjusted mean or median patterns for the CI and LI enterprises

8.4.1 Statistical analysis of ratio patterns

The dividend per share is an example of a ratio which exhibits cyclical mean and median patterns for both the CI and LI enterprises. Figure 8.7 is an illustration of the dividend per share, which is presented as an example of a lag mean and median pattern.

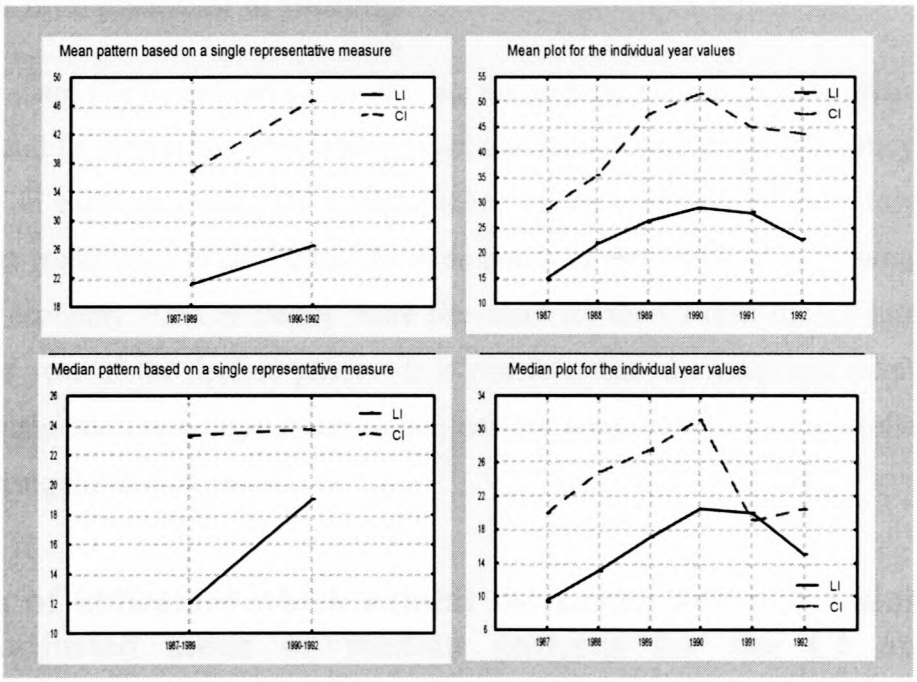

Figure 8.7: An illustration of a lag mean and median pattern of both the CI and LI enterprises for dividend per share for the individual years of the analysis and a single representative measure

Figure 8.7 indicates that both the CI and LI enterprises exhibit lag mean and median values from the upswing to the decline phase. The mean and median patterns based on a single representative measure also indicate an increasing trend for both the CI and LI enterprises. The CI enterprises have larger mean values than the LI enterprises over the entire period.

The DPS [LI, 36]; [CI, 32] do not indicate substantial variation among both the CI and LI enterprises when the mean and median plots are compared. The removal of several outliers [LI, 36]; [CI, 29] reduces the variation further (see Appendix 8B). It is therefore possible to use the adjusted mean profile for the purpose of pattern recognition and analysis, while an analysis of the mean profiles of the CI and LI enterprises is also possible. The analysis indicates that the profiles are parallel (p=0,8481). As a consequence it is also possible to determine that the mean profile of the CI enterprises is not statistically significantly higher than the mean profile of the LI enterprises (p=0,1889), i.e. the profiles are coincident.

DPS is the only ratio which indicates a lag pattern for both the CI and LI enterprises. If either the CI or LI enterprises would have indicated a lag pattern, the ratio would be included as part of the mixed pattern group discussed in a following section.

8.4.2 Financial interpretation of findings

The dividend per share (DPS) indicates a similar lag for both the CI and LI enterprises. This indicates that CI and LI enterprises were able to maintain their dividend growth policy in line with the increase in earnings during the initial decline in the economic cycle. However, a subsequent change (reduction) in DPS could be in response to the reduction in earnings and a slowdown in the economy. This is clearly more prevalent for the CI than the LI enterprises during the second year of the decline phase. It is possible that LI enterprises might use a rights issue to obtain additional capital during the decline phase due to a lesser reliance on debt financing during the decline phase.

8.5 Analysis of indicators which exhibit increasing and decreasing lead mean, adjusted mean or median patterns for the CI and LI enterprises

8.5.1 Statistical analysis of ratio patterns

Growth in attributable earnings is an example of an indicator that exhibits a lead pattern with decreasing mean or median values during the upswing phase and increasing values for the decline phase (which commences in the fourth year of the analysis). Figure 8.8 is an illustration of the growth in attributable earnings ratio that exhibits a decreasing lead median pattern for the CI and LI enterprises (see graph at the bottom right of Figure 8.8).

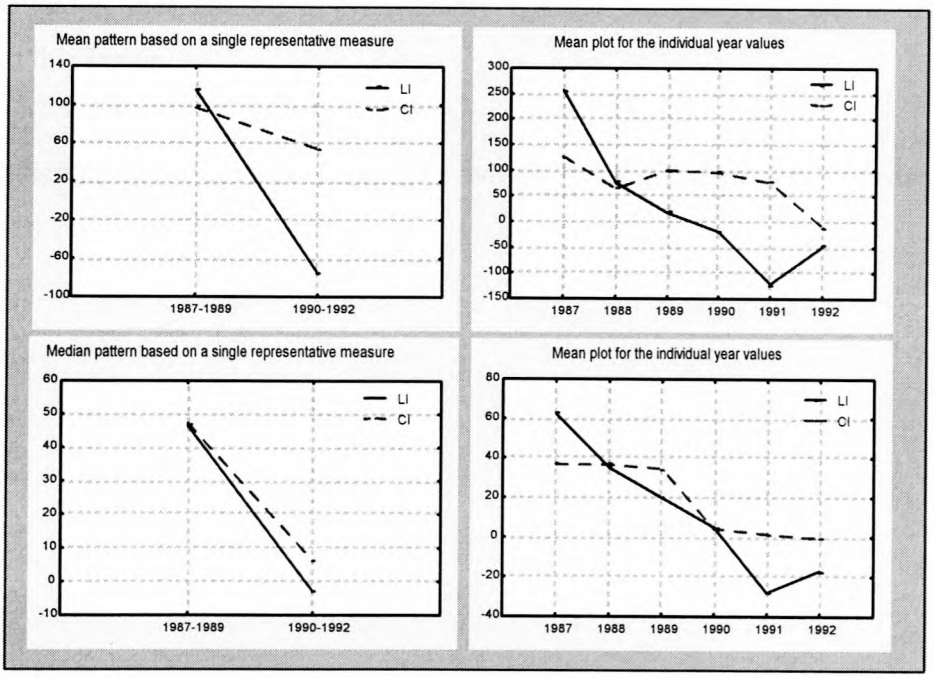

Figure 8.8: An illustration of a decreasing lead mean and median pattern of both the CI and LI enterprises for growth in attributable earnings based on individual years of the analysis and for a single representative measure

Figure 8.8 indicates that both the mean and median patterns of the CI and LI enterprises differ. The CI enterprises indicate a declining pattern during the initial period of the upswing phase and a slight increase during the latter stages of the upswing, while flattening off into the decline phase, which then indicates a decline pattern. The LI enterprises exhibit a declining pattern over the upswing and a large part of the decline phase, with the latter year indicating an upward inclination. The mean and median patterns based on a single representative measure indicate a decreasing pattern for the LI and CI enterprises as expected.

Perusal of the mean and adjusted mean patterns (see Appendix 8B) of the CI and LI enterprises indicates substantial differences between the two patterns. A comparison of the adjusted mean and median patterns indicates substantial scale and pattern differences. The variation exhibited by the covariance matrices of the CI and LI enterprises also confirms the differences in the variance among the individual years for the mean and adjusted mean (see Appendix 8A). In this context the median patterns of the CI and LI enterprises are more appropriate to use when interpreting the behaviour of the ratio from a financial management perspective. The lead for both the CI and LI enterprises is formed during the upswing phase in the second or third year and continues into the decline phase. The median of the CI

enterprises is larger than the LI enterprises over the entire period. A profile analysis is only applicable to ratios that exhibit approximately normal distributions and is therefore not appropriate in this instance.

Table 8.2 indicates the ratios per category which exhibit increasing and declining lead patterns.

Table 8.2: Classification of ratios per category that exhibit increasing and decreasing lead patterns

Type of pattern	TYPE [3] PATTERNS Lead mean, adjusted mean or median patterns for CI and LI enterprises	Mean, adjusted mean or median pattern*	Status **	Signifi-cant ***	N before outlier deletion****	N after outlier deletion****
Profitability [0]	None					
Growth [2]	Growth in earnings per share (GEPS) Growth in attributable earnings (GATTEARN)	Median Median	N/A N/A	N/A N/A	[LI, 33];[CI, 32] [LI, 33];[CI, 32]	[LI, 29];[CI, 27] [LI, 26];[CI, 27]
Cash Flow [1]	CTA to interest payments (CTA:INT)	Median	CI	N/A	[LI, 33];[CI, 30]	[LI, 32];[CI, 26]
Value [4]	Value index – MVE:BE Value index – MVE:BVE per share Value index – ROE (after tax):earnings yield (ROE_{t-1}:EY) Market value-added ratio (MVA)	Median Median Median Median	N/A N/A CI CI	N/A N/A N/A N/A	[LI, 33];[CI, 32] [LI, 33];[CI, 32] [LI, 33];[CI, 31] [LI, 33];[CI, 32]	[LI, 33];[CI, 32] [LI, 33];[CI, 32] [LI, 33];[CI, 31] [LI, 33];[CI, 32]
Inflation adjusted [0]	None					

Note: See Table 8.1 for an explanation of the table headings marked with an asterisk (*)

Table 8.2 indicates that 7 (12%) of the 57 financial ratios used in the analysis exhibit decreasing lead adjusted mean or median patterns. Neither the profitability nor the inflation-adjusted groups indicate any lead patterns. The value category indicates four ratios, the growth category two and cash flow category one. The median is used to analyse the patterns exhibited by the CI and LI enterprises for all the ratios that exhibit lead patterns. This is necessary due to the persistence of variation among the ratio data after the removal of a large number of outliers. Furthermore, log transformations are used in support of the mean and mean adjusted patterns of ratios (see Appendix 8B) that form part of the value category. The number of outliers identified among the CI and LI enterprises account for a small number of the total and are therefore relatively insignificant in terms of the reduction in the valid number of data points.

8.5.2 Financial interpretation of findings

It appears that the growth in earnings per share and growth in attributable earnings increases at a slower rate from the upswing to the decline phase. Growth in earnings per share improves at a slower rate for both the CI and LI enterprises, which may be caused by a low base at the beginning. This pattern is therefore also to be expected. It is also of interest to note that the decline for LI enterprises is more severe than for the CI enterprises during the upswing phase in particular (see Figure 8.8).

The cash flow coverage ratio for interest payments indicates that the decrease in coverage is more severe in CI enterprises than in LI enterprises. Figure 8.9 is a graphic representation of the mean and median cash flow to interest payment ratio for the CI and LI enterprises together with the mean and median patterns based on a single representative measure.

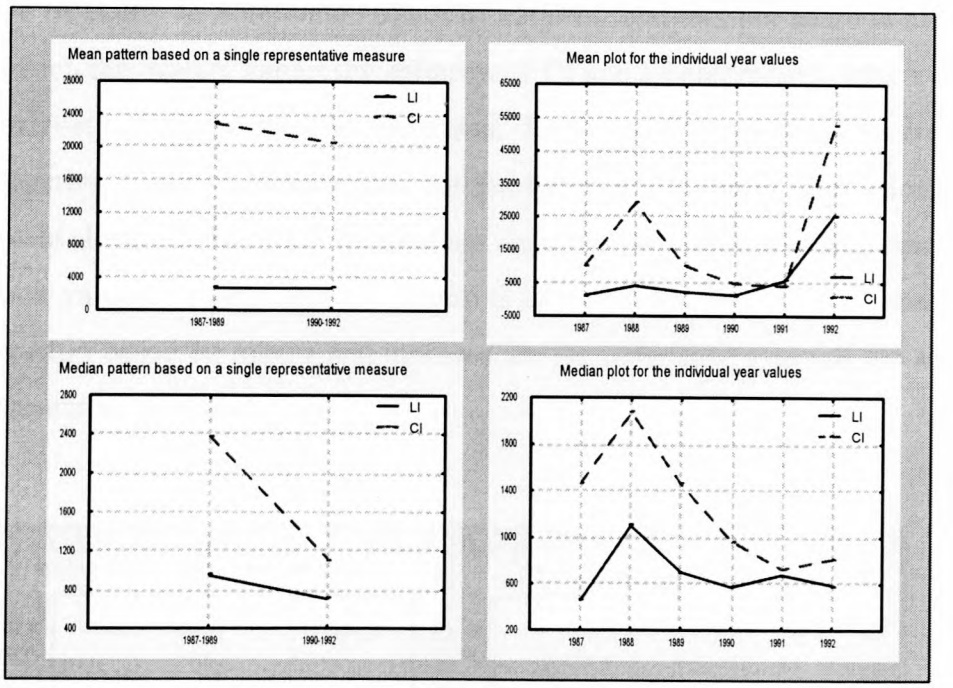

Figure 8.9: An illustration of a decreasing lead mean and median pattern of both the CI and LI enterprises for cash flow to interest payments based on individual years of the analysis and a single representative measure

The median pattern exhibited by the CI enterprises is noteworthy and unexpected due to the use of less debt during the upswing phase (refer to mean and median graphs on the right side of Figure 8.9). It is clear from Figure 8.9 that outliers are present among the CI enterprises if the graph of the means based on the individual years is considered. However, it is not possible to determine whether or not outliers are present from the graph of the mean (top left) based on a single representative measure.

In addition, it would be expected that cash flow would improve and that CI enterprises would also be in a position to reduce debt and consequently related finance charges during the upswing phase. This scenario would cause the coverage to increase and not decrease. LI enterprises use more debt during the upswing phase as indicated by the interest-bearing debt to total shareholders' interest (see also Figure 8.12). It is therefore to be expected that even though cash flow is expected to improve during the upswing phase the financing charges may increase at a faster rate. Furthermore, it is also to be expected that coverage should improve in an economic upswing and decrease during the decline phase for both groups although the magnitude of the fluctuations in coverage will differ between them due to the use of debt financing.

Market value of equity to book value of equity ratio in total and per share is affected by the manner in which the market values the earnings of CI and LI enterprises, which consequently causes the market to adapt to these expectations. Furthermore, these findings are relevant for market forecasting and also indicate that the market acts and reacts in a rational manner to economic cycle changes. The ROE to earnings yield ratio complements these market value of equity to book value of equity ratios. Figure 8.10 illustrates the mean and median patterns for the latter ratio based on means and medians for the individual years of the analysis and a single representative measure.

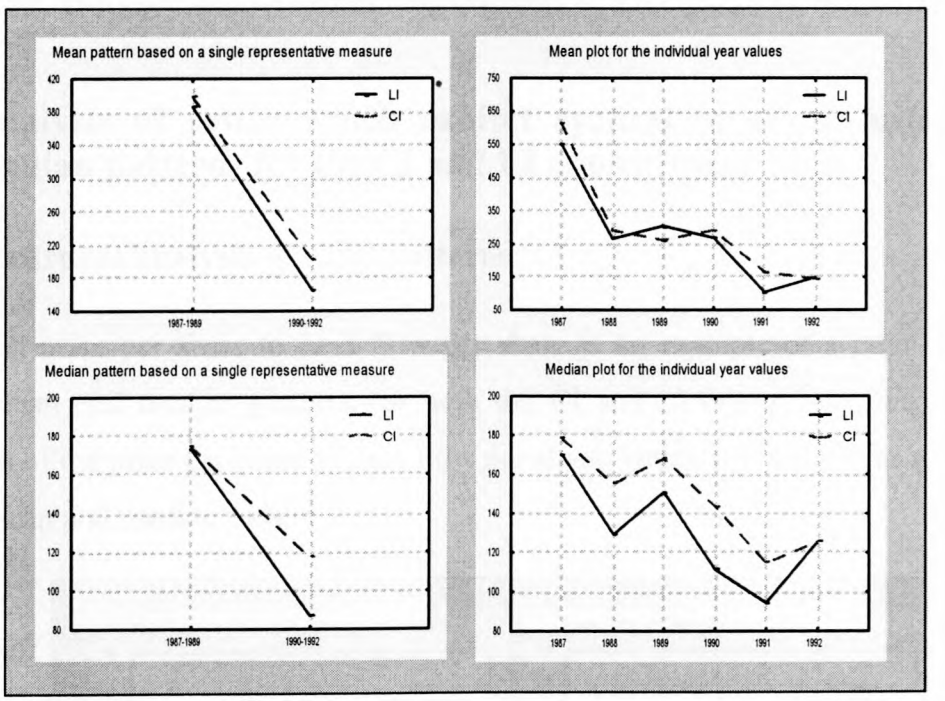

Figure 8.10: An illustration of a decreasing lead mean and median pattern of both the CI and LI enterprises for ROE to earnings yield based on the individual years of the analysis and a single representative measure

The median patterns exhibited by the CI and LI enterprises appear to exhibit similar patterns, although at different levels (refer to graph at the bottom right of Figure 8.10). Generally this could possibly be attributed to an improvement in ROE due to higher sales and increased operating income, while earnings yield also increases at a faster rate from the previous year. A slight improvement in the ratio from one year to the next could be attributed to an improvement in ROE, while the earnings yield decreases. The latter is negatively affected by the share price, which may also be susceptible to market risk. Again the effect of market perception could significantly influence the trend of the ratio. A lead pattern is possibly not

what may be expected during an upswing phase of the economic cycle for either of the two groups, but does indicate that the market reacts in a rational manner.

The market value of ordinary shareholders' interest and interest-bearing debt to total capital ratio is primarily affected by shareholder sentiment. It is clear that the market reacts to, and anticipates, cyclical changes in the economy. The market expectations regarding the share price of CI enterprises during the upswing period gradually decreases, causing the market value to decrease closer to the decline phase. This may be in anticipation of a slow-down in the economy or other factors that affect international markets. Further analysis of this trend may indicate levels of risk aversion among investors in anticipation of the decline phase.

8.6 Analysis of ratios which exhibit cyclical mean, adjusted mean or median patterns for the CI and LI enterprises

8.6.1 Statistical analysis of ratio patterns

The market price per share to cash flow per share is an example of a ratio which exhibits cyclical mean and median patterns for both the CI and LI enterprises. Figure 8.11 is an illustration of the price per share to cash flow per share, which is presented as an example of a cyclical mean and median pattern.

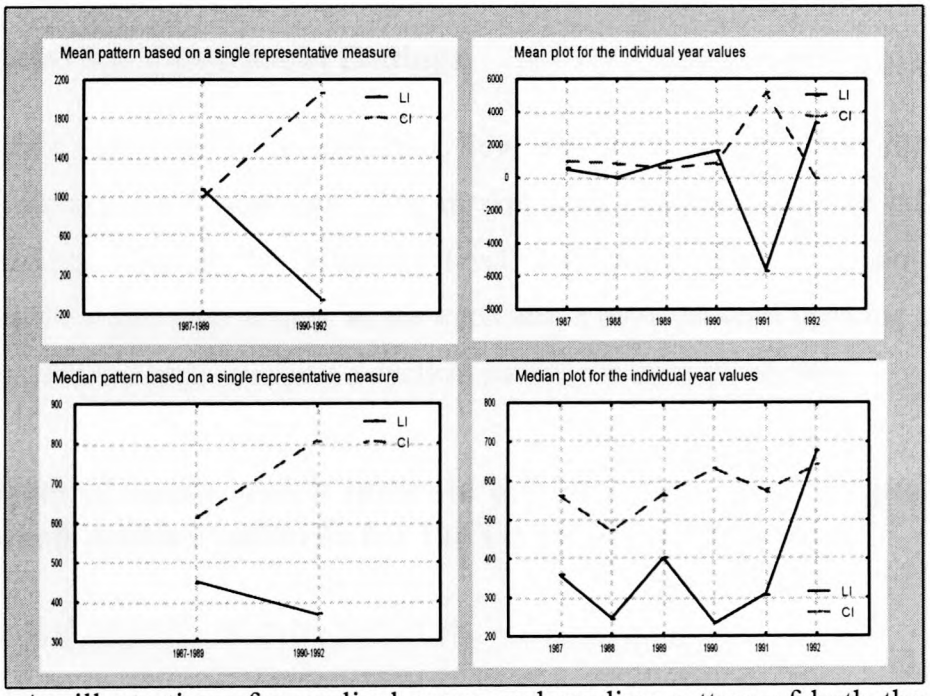

Figure 8.11: An illustration of a cyclical mean and median pattern of both the CI and LI enterprises for price per share to cash flow per share for the individual years of the analysis and a single representative measure

Figure 8.11 indicates that both the CI and LI enterprises exhibit cyclical mean and median values during the upswing and decline phases. The mean and median patterns based on a single representative measure indicate an increasing trend for the CI enterprises and a decreasing trend for the LI enterprises. No clear distinction is possible between the CI and LI enterprises due to the cyclical nature of the ratio.

The (P/SHARE: CATA/SHARE) [LI, 30]; [CI, 30] indicates significant variation among both the CI and LI enterprises when the mean and median plots are compared. The covariance matrices of the mean and adjusted mean also confirm the substantial variation among the CI and LI enterprises (see Appendix 8A). Even if the outliers are excluded [LI, 20]; [CI, 25], the ratio exhibits adjusted mean patterns for both the CI and LI enterprises which still differ substantially from the median pattern (see also Appendix 8B). This is confirmed by an analysis of the covariance matrices. The presence of large variation among the enterprises during the individual years requires that the median pattern be analysed in support of the financial interpretation.

This is the only ratio which shows a cyclical pattern for the CI and LI enterprises. If either the CI or LI enterprises indicated a cyclical pattern, the ratio would be included as part of the mixed pattern group. The mixed group of patterns is discussed in the following section.

8.6.2 Financial interpretation of findings

Both the market price per share and cash flow per share as individual indicators are susceptible to substantial fluctuations. The market price and cash flow are influenced by various risk factors, which in turn affect the level of the ratio. The price of an enterprise's share and cash flow fluctuate widely as the economy moves between upswing and decline phases. It is therefore normal to expect a cyclical pattern for this type of ratio.

8.7 Analysis of ratios which indicate mixed mean, mixed adjusted mean or mixed median patterns for the CI and LI enterprises

8.7.1 Statistical analysis of ratio patterns

Ratios which are categorised in this group exhibit different mean, adjusted mean and median patterns for the CI and LI enterprises. Mixed patterns resemble a combination of normal

expected, lead, lag or cyclical patterns as identified above. For instance, the CI enterprises may indicate a normal expected pattern for a particular ratio, while the LI enterprises indicate a lag pattern. The nature of these patterns limits the possibility of using the ratios for the purposes of forecasting and drawing significant conclusions. Figure 8.12 is an illustration of the ratio, interest-bearing debt to total shareholders' interest, which exhibits a mixed mean and median pattern for the CI and LI enterprises.

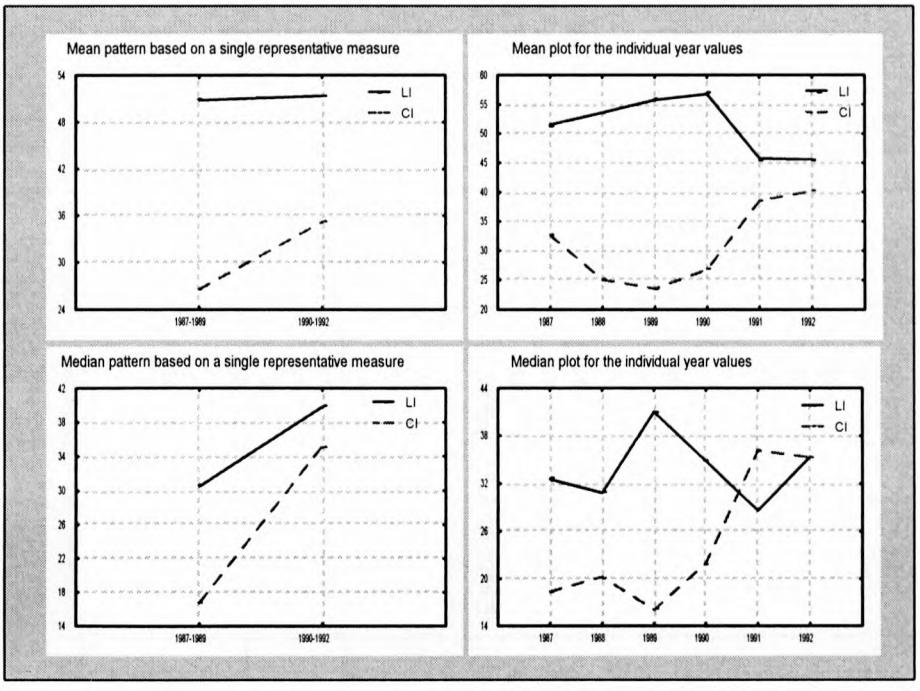

Figure 8.12: An illustration of a mixed mean and mixed median pattern of both the CI and LI enterprises for interest-bearing debt to total shareholders' interest ratio for the individual years of the analysis and a single representative measure

The mean and median patterns based on a single representative measure indicate increasing patterns for both the CI and LI enterprises for the interest-bearing debt to total shareholders' interest (IBD:TSI) ratio. This ratio exhibits different mean and median patterns for the CI and the LI enterprises (refer to the mean and median graphs on the right of Figure 8.12). Perusal of the covariance matrices of the mean confirms the variation among the CI and LI enterprises (see Appendix 8A). The removal of enterprises considered as outliers from both groups reduces the variance, but not to the extent that the CI and LI enterprises have similar adjusted mean and median patterns (see also Appendix 8B). In this instance it may be more appropriate to use the median patterns of the CI and LI enterprises for analytical purposes. The CI enterprises indicate an increasing lag median pattern, while the LI enterprises indicate a cyclical pattern.

Table 3 indicates the ratios per category which exhibit mixed patterns.

Table 8.3: Classification of ratios per category that exhibit mixed patterns

Type of pattern	TYPE [5] PATTERNS Mix mean, mixed adjusted mean or mixed median patterns for CI and LI			Mean, adjusted mean or median pattern*	Status **	Signifi-cant ***	N before outlier deletion****	N after outlier deletion****
		CI Pattern	LI Pattern					
Profit-ability [2]	Earnings per share (EPS)	Lead	Lag	Median	CI	N/A	[LI, 33];[CI, 32]	[LI, 31];[CI, 30]
	Interest-bearing debt to total shareholders' interest (IBD:TSI)✓	Lag	Cyclical	Median	N/A	N/A	[LI, 33];[CI, 32]	[LI, 30];[CI, 31]
Growth [3]	Growth in net sales (GTURN)	NEI✓✓	Cyclical	Mean	N/A	0,271	[LI, 23];[CI, 28]	[LI, 19];[CI, 26]
	Growth in total net assets (GTNA)	Cyclical	Cyclical	Median	N/A	N/A	[LI, 33];[CI, 32]	[LI, 29];[CI, 27]
	Growth in total shareholders' interest (GTSI)	NEI	Lag	Median	N/A	N/A	[LI, 33];[CI, 32]	[LI, 27];[CI, 27]
Cash flow [15]	CTA to total net assets (CTA:TNA)	NEI	Cyclical	Mean	N/A	0,700	[LI, 33];[CI, 32]	[LI, 27];[CI, 32]
	COA to total net operating assets (COA:TNOA)	NEI	Lag	Mean	N/A	N/A	[LI, 33];[CI, 32]	[LI, 25];[CI, 28]
	CATA to total shareholders' interest (CATA:TSI)	NEI	Cyclical	Mean	N/A	N/A	[LI, 33];[CI, 32]	[LI, 27];[CI, 30]
	NCTA to [gross non-current assets and net current assets] (Reinvestment)	NEI	Cyclical	Mean	N/A	N/A	[LI, 31];[CI, 30]	[LI, 26];[CI, 28]
	CATA to ordinary dividend payments (CATA:DIV)	Lead	Cyclical	Median	N/A	N/A	[LI, 24];[CI, 23]	[LI, 21];[CI, 22]
	CATA to total debt (CATA:TD)	Lead	Cyclical	Median	CI	N/A	[LI, 31];[CI, 30]	[LI, 29];[CI, 25]
	CATA to current liabilities (CATA:CL)	Lead	Cyclical	Median	CI	N/A	[LI, 31];[CI, 30]	[LI, 29];[CI, 27]
	CATA to [long-term loans repaid + fixed asset purchases + total dividend paid] (CATA:(L/T Loans + FA + TOT.DIV)	Lead	Cyclical	Median	N/A	N/A	[LI, 29];[CI, 30]	[LI, 21];[CI, 30]
	NCTA to [capital investments + financial investments + capital redemption] (NCTA: (CAP.INV + FIN.INV + CAP.RED)	Lead	Cyclical	Median	N/A	N/A	[LI, 30];[CI, 30]	[LI, 21];[CI, 24]
	CATA to net income after tax (CATA:NIAT)	Lead	Lag	Median	N/A	N/A	[LI, 31];[CI, 30]	[LI, 24];[CI, 25]
	NCTA to capital investments (NCTA: CAP.INV)	Lead	NEI	Median	CI	N/A	[LI, 30];[CI, 30]	[LI, 27];[CI, 25]
	Cash flow (CATA) to turnover (CATA:TURN)	Cyclical	Lag	Median	CI	N/A	[LI, 23];[CI, 28]	[LI, 19];[CI, 26]
	Working capital to operating cash flow (WC:OCF)	Cyclical	NEI	Median	LI	N/A	[LI, 31];[CI, 30]	[LI, 25];[CI, 27]
	CATA (less pref. dividend) per share (CATA/SHARE)	Cyclical	Cyclical	Median	CI	N/A	[LI, 31];[CI, 30]	[LI, 26];[CI, 25]
	CTA (less interest paid) to net income before tax (CTA:NIBT)	Other✓✓✓	Other	Median	N/A	N/A	[LI, 33];[CI, 32]	[LI, 29];[CI, 28]

Type of pattern	TYPE [5] PATTERNS Mix mean, mixed adjusted mean or mixed median patterns for CI and LI (continued)			Mean, adjusted mean or median pattern*	Status **	Signifi-cant ***	Before outlier deletion****	After outlier deletion****
		CI Pattern	LI Pattern					
Value [2]	Warranted equity value:book value of equity (WEV:BVE) Tobin's Q-ratio	Cyclical Converse to normal	NEI Lead	Median Median	N/A LI	N/A N/A	[LI, 33];[CI, 32] [LI, 33];[CI, 32]	[LI, 33];[CI, 32] [LI, 33];[CI, 32]
Inflation adjusted [0]	NONE							

✓ This ratio is generally considered as an indication of the solvency position of an enterprise. It is included as part of the profitability group because it affects the return on total shareholders' interest. In addition, the leverage factor which considers an enterprise's use of debt financing to its use of equity capital when multiplied by the RONA provides a value for the ROE.

✓✓ NEI = normal expected increasing

✓✓✓ "Other" refers to a pattern that could not be classified in any one of the four pattern groups.

See Table 8.1 for a description of the items marked with an asterisk (*) in the above table.

Table 8.3 indicates that 22 (39%) of the 57 financial ratios used in the analysis exhibit mixed mean, mixed adjusted mean or mixed median patterns. The mixed pattern group also represents the second largest group of patterns. Of the 22 ratios, two are classified as profitability, three growth, 15 cash flow and two value indicators. The patterns based on the median are used for financial analysis of CI and LI patterns for 17 of the ratios, while the adjusted mean patterns are used in the remaining five cases. A total of eight of the 22 ratios that indicate mixed patterns are based on total net assets or components of assets.

It is noteworthy that 15 of the 18 cash flow ratios analysed in the study exhibit mixed patterns. This finding should be considered in the context of the apparent limited use of cash flow indicators by large enterprises for financial decision-making as well as the fluctuations that occur in cash inflows and outflows.

Given the nature of mixed patterns, it is more difficult to differentiate between CI and LI enterprises on the basis of the patterns exhibited by the ratios. Only in six cases is it possible to identify a situation where the CI enterprises have larger median values than the LI enterprises over the entire period. An analysis of the individual CI and LI patterns indicates that the CI enterprises exhibit largely expected normal decreasing lead patterns and the LI enterprises generally indicate cyclical patterns. Outliers are present among the CI and LI enterprises, however, only in a limited number of cases is it necessary to remove a large number of enterprises considered as outliers in order to enable relevant deductions from an analysis of the patterns.

Profile analysis could be used for those ratios which indicate patterns based on the mean or adjusted mean. However, given the nature of a mixed pattern, only two of the ratios indicate parallel profiles for the CI and LI enterprises. The findings indicate that the CI and LI profiles are coincident. Profile analysis is not applicable to the median as indicated previously.

The findings highlight several interesting aspects relevant to the patterns exhibited by the CI and LI enterprises. These aspects are interpreted from a financial management perspective in the following section.

8.7.2 Financial interpretation of ratios exhibited by the mixed pattern group

8.7.2.1 Mixed patterns which form part of the profitability category

The first two ratios that form part of the mixed pattern group are important indicators of financial performance and are often used by enterprises for evaluation purposes. The apparent lead exhibited among the CI enterprises for earnings per share (EPS) indicate the effect of anticipated improvement in earnings prior to the following upswing cycle in the economy. For instance, a reduction in interest rates and the anticipated changes in consumer expenditure may be possible reasons for the lead pattern. It is also possible that the apparent lead among the CI enterprises may be an indication of an upswing in the economic cycle. The LI enterprises indicate a lag pattern, which indicates the ability of these enterprises to sustain and improve earnings during the initial stages of a decline phase in the economic cycle.

The interest-bearing debt to total shareholders' interest ratio (IBD:TSI) indicates opposite patterns for the CI and LI enterprises over the total period. The CI enterprises indicate an increasing lag pattern and the LI enterprises a cyclical pattern. It is apparent from an analysis of the patterns based on the median that LI enterprises require more debt financing during the upswing period to finance working capital requirements. CI enterprises appear to use less debt financing during the upswing period relative to total shareholders' capital mainly due to a fuller utilisation of existing assets. During the decline phase LI enterprises use less debt, while CI enterprises use more debt financing due to the possible existence of excess capacity. The use of debt financing by the CI and LI enterprises indicated previously could be attributed to higher fixed cost levels among CI enterprises as opposed to LI enterprises. It is possible that during a decline in the economy LI enterprises are able to finance operations from internal sources as less working capital is required.

8.7.2.2 Mixed patterns which form part of the growth category

The ratio patterns in the growth category indicate large fluctuations among the CI and LI enterprises from year to year. The LI enterprises in particular exhibit substantial fluctuations in sales and total net assets. The cyclical pattern of sales among LI enterprises may be caused by factors such as instability in consumer demand caused by a reaction to changes in economic activity. Another contributing factor to the cyclical patterns could be the different levels of capacity utilisation among LI enterprises. As a consequence it appears that

forecasting financial performance in LI enterprises based on growth ratios is constrained by the instability of the ratio patterns.

The patterns of the growth ratios for the CI enterprises appear to indicate higher levels of stability. The greater stability of the patterns among the CI enterprises would enhance the forecasting of financial performance using these growth ratios and increase the significance of the forecasting results. It appears that CI enterprises indicate less fluctuation and more consistency in capacity utilisation. The reason for this may be attributed to longer sales cycles and contracts which are concluded well before the date of commencement. These contracts are generally large in Rand value and also have longer deployment periods. In this manner it is possible to appropriately manage sales and the acquisition of the fixed and current assets required to service projects.

8.7.2.3 Mixed patterns which form part of the cash flow category

It appears that cash flow ratios used to analyse financial performance exhibit general instability among LI enterprises. It would therefore be difficult to forecast financial performance based on cash flow with any high degree of accuracy. The irregular cash flow changes also make the management of cash more difficult. It is therefore more complex to anticipate changes in market conditions and working capital requirements. The fluctuations exhibited by cash flow ratios that describe financial performance in LI enterprises could also be a reason for their limited use in internal financial performance measurement.

The patterns exhibited by the cash flow ratios of CI enterprises are in contrast to those of the LI enterprises. A greater level of stability is exhibited by the ratio patterns for CI enterprises. This enhances the ability to forecast financial performance among CI enterprises and further increases the significance of the forecasted values. CI enterprises appear to be able to manage cash flow more effectively than LI enterprises. This is caused by the generally larger projects undertaken by CI enterprises and the time frames for milestone payments are known well in advance. As contracts generally extend over several years, it is possible to manage cash flow, fixed asset replacement and acquisition as well as working capital needs in a more appropriate manner. In other types of CI enterprises it appears that careful planning is done before large capital investments are approved. The findings may also suggest that CI enterprises use less working capital.

It is also possible that the effective and efficient management of cash flow and total net assets could also cause CI enterprises to forecast and therefore anticipate a decline phase of the economic cycle. The predictive ability of cash flow ratios for CI enterprises to forecast a decline in the economic cycle further enhances the ability to forecast financial performance.

8.7.2.4 Mixed patterns which form part of the value category

Shareholders and analysts appear to consider the financial performance of CI and LI enterprises as determined by the value ratios differently. CI enterprises generally appear to be more volatile than LI enterprises in response to movements in the economic cycle. The nervousness about having to service high levels of fixed costs given a decline in the economic cycle appears to affect negatively the financial performance of CI enterprises as measured by value ratios.

Value ratios for LI enterprises react positively to an upswing in the economic cycle. This reaction, which is to be expected, may be attributed to an improvement in shareholder returns and the positive sentiment of the market towards improved performance. During the decline phase income may increase, but not at the same rate as during the upswing phase. The share price of the LI enterprises may be negatively affected due to market sentiment during a decline phase. It appears that the LI enterprises are favoured by the market based on value performance indicators during a decline phase.

It is to be expected that the market would value CI enterprises and LI enterprises more favourably during an upswing. However, given the volatile nature of stock markets and the lagged reaction of the economy to the market, it is of interest to note the behaviour of CI and LI enterprises in response to changes in the economic cycle and the reaction of the market to CI and LI enterprises. Forecasting financial performance by using value indicators is complex, given the nature of value ratios and the reliance on stock market movements.

8.8 Summary

The results presented in this chapter are based on the analysis of the ratio data for CI and LI enterprises for each of the individual years of the study (1987-1992). A comprehensive list of 57 indicators was considered in the analysis. The fluctuations in the economic cycle and their effect on financial performance indicators for CI and LI enterprises have not previously been investigated in any depth. The findings also emphasise the need to consider additional internal and external factors such as industry effects and globalisation when using indicators to measure financial performance.

Consequently, the research is intended to indicate that certain ratios could not be used with confidence universally across all types of enterprises when measuring or forecasting financial performance. The selection and application of the financial ratios would depend on the CI and LI nature of the enterprise and this argument would also be applicable to either or both the upswing and decline phase of the economic cycle. Furthermore, the findings of this chapter aim to provide a basis which would enhance understanding of the use of appropriate indicator(s) in the context of the CI and LI nature of an enterprise and the phase of the economic cycle, as opposed to the general application of indicators when measuring financial performance.

8.8.1 Approach used to determine and analyse the ratio patterns

The mean and median of each ratio were calculated for the CI and LI groups for each year of the research period. An initial analysis of the mean and median patterns indicated the presence of outliers among a large number of the ratios. A more in-depth analysis of possible outliers was conducted by visually investigating the scatterplots of the means for each year in an interactive manner. This was accomplished by using the "brush" functionality of the S-PLUS (1997) statistical software package in a manner which also enables the removal of data points considered visually to be outliers. Adjusted-mean patterns with the outlier values excluded were obtained, which are similar to the median profiles in several cases. It is therefore possible to conduct a profile analysis using Hotelling's T^2 test of the CI and LI profiles for ratios with outliers removed and when the mean and median profiles for the CI and LI enterprises correspond.

The pattern of each indicator was analysed over the entire period of the study. On the basis of its pattern, each ratio was assigned to a pre-determined group of patterns, i.e. normal expected patterns, lead patterns, lag patterns, cyclical patterns and mixed patterns. A profile analysis of the mean was also used to distinguish between the level of the CI and LI enterprises for those patterns which were based on the mean or adjusted mean. For cases where the variation was substantial, the mean or adjusted mean was unsuitable and a pattern based on the median was used to analyse the ratios. The discussion of each category of patterns focused; firstly, on the statistical analysis of the patterns and; secondly, on the financial interpretation of the ratio patterns for the CI and LI enterprises over the upswing and decline phase of the economic cycle.

8.8.2 Classification of indicators per pattern group

A summary of the ratio classification per pattern type is indicated in Table 8.4.

Table 8.4: A classification of the ratios per type of pattern

Type of pattern / Group of ratios	Normal expected	Lead	Lag	Cyclical	Mixed
Traditional	12	0	1	0	2
Growth	2	2		0	3
Cash flow	0	1		1	15
Value	3	4		0	2
Inflation-adjusted	9	0		0	0
Total [57]	**26**	**7**	**1**	**1**	**22**

Table 8.4 shows that overall 46% of the financial ratios used in the analysis exhibit increasing normal expected adjusted mean or median patterns for both the CI and LI enterprises during both the upswing and decline phase of the economic cycle. The analysis of the patterns is based on the mean or adjusted mean for 30 of the 57 indicators, while the median is used in the remaining cases. All the ratios indicate increasing normal expected patterns, while no decreasing normal expected patterns are evident from the analysis. These findings are expected and no significant deductions could be made regarding the behaviour of the ratios that form part of this category. LI enterprises generally have higher ratio values than CI

enterprises due to higher turnover ratios and lower income margins. Higher margins and lower turnover ratios are prevalent among the CI enterprises.

Of the 26 ratios that exhibit increasing normal expected patterns, 12 are classified as profitability. This represents 80% of the traditional profitability ratios included in the study. The traditional profitability indicators often used for measuring financial performance such as RONA, RNOA, ROE and EVA form part of this pattern group. These profitability indicators are suitable for financial performance measurement and forecasting in CI and LI enterprises irrespective of the phase of the economic cycle. All the inflation-adjusted ratios exhibit normal expected patterns. The generally quoted ratios for the CI and LI enterprises also exhibit similar patterns to the upswing and decline movements of the economic cycle. In addition, two growth, three value and nine inflation-adjusted indicators also form part of this group (see Table 8.1). A total of 24 (92%) of the 26 ratios relate either directly or indirectly to the profitability of the enterprise.

Only seven (12%) of the 57 financial ratios exhibit decreasing lead median patterns. None of the ratios in either the profitability or the inflation-adjusted groups indicates any lead patterns. The value category indicates four ratios, the growth category two and cash flow category one. The ratios that indicate lead patterns are particularly relevant. Further analysis is required, such as the use of multiple upswing and decline cycles in the economy. However, these ratios provide an initial indication of being able to lead the economic cycle. Ratios that exhibit lead patterns could possibly be used to forecast financial performance.

Only one ratio exhibits a strong lag pattern for both the CI and the LI enterprises. However, ratios that exhibit a lag pattern for either the CI or LI enterprises are grouped in the mixed pattern category.

The price per share to cash flow per share is the only ratio that exhibits a cyclical median pattern. Both the CI and LI enterprises indicate cyclical movements in response to an upswing and decline in the economic cycle (see section 8.6).

The remaining 22 (39%) financial ratios used in the analysis exhibit mixed mean, adjusted mean or median patterns. The mixed pattern category also represents the second largest group of ratios. Of the 22 ratios, two are classified as profitability, three growth, 15 cash flow and

two value indicators. The patterns based on the median are used for financial analysis of CI and LI enterprises for 17 of the ratios, while the adjusted mean is used in the remaining five cases. Among the 22 ratios, eight are based on total net assets or components of total assets. It is of interest that 15 of the 18 cash flow ratios used in the study exhibit mixed patterns. This finding should also be considered in the context of the limited use of cash flow indicators by large enterprises for financial decision-making and forecasting and the fluctuations and sensitivity often associated with cash inflows and outflows.

8.8.3 Relevance of the findings for forecasting financial performance

Ratios that form part of the normal expected group of patterns and the lead group of patterns may be appropriate for the purposes of medium- and long-term financial forecasting. The patterns illustrated by the ratios that exhibit increasing normal expected patterns could be used with confidence for the purpose of forecasting. Furthermore, the stability exhibited by these ratios over an upswing and decline in the economic cycle further enhances their use for forecasting purposes.

The single ratio assigned to the group of cyclical patterns appears to be less suitable for forecasting. The ratio indicates general instability over the duration of the upswing and decline phase of the economic cycle.

Mixed patterns exhibited by either or both CI and LI enterprises that indicate increasing normal expected patterns and decreasing lead patterns could also be used for forecasting, given their relative stability over the upswing and decline phases, but with less confidence, however.

8.8.4 Key findings for important ratios used generally and widely for financial performance measurement

The following discussion highlights several findings that are related to ratios that are generally and widely used to measure and highlight the financial performance of enterprises. The findings relevant to these ratios are considered in the context of the CI or LI nature of an enterprise and the upswing and decline phase of the economic cycle.

Many of the traditional profitability indicators of financial performance such as **RONA, ROE, RNOA** and the value indicator **EVA** follow the trade cycle. These results are to be expected and consequently not many conclusions could be drawn from the findings. This may be attributed to the composition of the ratios, which are based on assets or components of assets and do not fluctuate significantly from year to year due to the historic cost basis for the valuation of the assets. LI enterprises have mostly higher ratio values than CI enterprises due to the higher turnover ratios and lower income margins among LI enterprises and higher income margins and lower turnover ratios among the CI enterprises.

The apparent lead exhibited among the CI enterprises for EPS indicates the effect of anticipated improvement in earnings prior to the following upswing cycle in the economy. For instance, a reduction in interest rates and the anticipated changes in consumer expenditure may be possible reasons for the lead pattern. It is also possible that the apparent lead among the CI enterprises may be an indication of an upswing in the economic cycle. The LI enterprises indicate a lag pattern which may allude to the ability of LI enterprises to sustain and improve earnings during the initial stages of a decline phase in the economic cycle.

DPS indicates a lag pattern for both the CI and LI enterprises. It is possible that both the CI and LI enterprises adhere to their dividend policy in the short term after the commencement of the decline phase. It becomes apparent during the decline phase that a reduction in the ratio occurs among both CI and LI enterprises, possibly for different reasons. As indicated previously, it appears that LI enterprises use less debt financing during the decline phase. A rights issue may cause a reduction in the DPS where the proceeds are used to supplement capital requirements.

CI enterprises use more debt financing during the decline phase. In contrast to the LI enterprises, it appears that adjustments may be made to the existing dividend policies of CI enterprises. It is also possible that a combination of debt and equity raising occurred causing the DPS to decrease. Furthermore, the lag pattern exhibited by the CI enterprises suggests that the economy may lead a decrease or increase in DPS. In addition, it is also possible that the lag pattern may be attributed to an increase in earnings during the initial stages of the decline phase, while the reduction in project income becomes evident after the slowdown in the economy and once outstanding payments related to contractual obligations are received.

An analysis of the **working capital to operating cash flow** ratio indicates a cyclical and an increasing normal expected pattern for the CI and LI enterprises respectively. The median patterns exhibited by this ratio suggests that cash flow increases at a faster rate than the working capital during the upswing phase, which leads to the conclusion that an increase in the working capital takes place before an upswing in the trade cycle. Furthermore, it may be possible to anticipate an improvement in the economy as demand for products and services increases, which results in a requirement for higher levels of working capital.

It appears that the **growth in earnings per share** and **attributable earnings** increases at a slower rate from the upswing to the decline phase. Growth in earnings per share improves at a slower rate for both the CI and LI enterprises, which may be caused by a slowing in the growth rate of earnings. This may be attributed to rate increases which are continuously measured on higher base figures. Both these ratios exhibit lead patterns, which highlights their relevance for forecasting financial performance.

The **market value of equity to book value of equity** ratio in total and per share exhibits lead patterns. These ratios are affected by the manner in which the market values the earnings of CI and LI enterprises, which consequently causes the market to adapt to expectations of economic upswing and decline. Furthermore, these findings are also relevant for market forecasting and also indicate that the market acts and reacts in a rational manner to changes in the economic cycle.

The **market value of ordinary shareholders' interest and interest-bearing debt to total capital** ratio is primarily affected by shareholder sentiment. It is clear that the market reacts to, and anticipates, cyclical changes in the economy if this ratio is considered.

The **interest-bearing debt to total shareholders' interest** ratio is used to highlight the gearing position of the enterprises and the use of debt to equity capital. The use of debt versus equity to finance operational activity appears to differ for CI and LI enterprises as a consequence of their gearing strategies. In addition, it would appear that the use of short- and long-term interest-bearing debt also differs between the two groups. LI enterprises exhibit more volatility in cash flow than the CI enterprises, which given the nature of these enterprises (with a generally lower fixed cost base than CI enterprises) is possibly unexpected. The findings for the LI enterprises may not be particularly suitable for financial forecasting;

however, the lead pattern exhibited by the CI enterprises could provide an indication of the use of debt in anticipation of changes in the economic cycle.

LI enterprises use more debt during the upswing phase as indicated by the interest-bearing debt to total shareholders' interest (see Figure 8.12). It is therefore to be expected that even though cash flow is anticipated to improve during the upswing phase, the financing charges may increase at a faster rate. It is to be expected that coverage should improve in an economic upswing and decrease during the decline for both groups although the magnitude of the fluctuations in coverage will differ between them due to the use of debt financing.

The **cash flow to interest payments** ratio indicates a lead pattern for both the CI and LI enterprises. This is appealing as it may be possible to anticipate changes in the economic cycle given the lead pattern. The finding indicates that irrespective of the CI or LI nature of the enterprise, the potential use and relevance of this ratio for forecasting movements in the economic cycle could be further researched.

8.8.5 Relevance of the findings for CI enterprises

The relevance of the results for a CI enterprise should be considered in the context of the changes that occur in demand for products and services during upswing and decline phases of the economic cycle:

- Debt financing is used during the decline phase to service fixed costs when demand for products and services decreases as a result of a slow-down in the economy.
- An increase in the cash flow interest coverage ratio during the decline phase may indicate an imminent upswing in the economic cycle.
- EPS may allude to an anticipated upswing in the economic cycle.

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8.8.6 Relevance of the findings for LI enterprises

The relevance of the results for LI enterprises should be considered in the context of the nature of these enterprises and the changes that occur in demand for products and services during upswing and decline phases of the economic cycle:

- An upswing in the economic cycle may be anticipated by an increase in the working capital to operating cash flow ratio.
- More debt financing is used during the upswing period, which may be attributed to greater demand and consequently results in a higher gearing position for the LI enterprises.
- An increase in the cash flow interest coverage ratio during the decline phase may indicate an imminent upswing in the economic cycle.

Appendix 8A: Covariance matrices of CI and LI enterprises for selected ratios

The following covariance matrices for selected ratios indicate the difference in the size of the variances between the years of the analysis before potential outliers are removed and after the removal of outliers.

1. Return on total net assets (before tax)

Original data set: Covariance matrix for LI enterprises

Year	1	2	3	4	5	6
1	584,1331	501,8510	486,1313	191,1699	271,4031	504,6255
2	501,8510	519,1625	485,2184	191,7263	282,1275	526,0530
3	486,1313	485,2184	500,0812	184,8304	266,3819	495,2110
4	191,1699	191,7263	184,8304	227,5291	155,3004	153,1685
5	271,4031	282,1275	266,3819	155,3004	386,6105	378,6863
6	504,6255	526,0530	495,2110	153,1685	378,6863	865,4600

Original data set: Covariance matrix for CI enterprises

Year	1	2	3	4	5	6
1	125,06333	107,68032	158,73202	83,30729	60,05738	36,44580
2	107,68032	143,2390	201,50920	91,66284	72,71337	31,98848
3	158,73202	201,50920	377,91380	141,47384	59,23761	24,29414
4	83,30729	91,66284	141,47384	133,31252	89,52368	84,32019
5	60,05738	72,71337	59,23761	89,52368	187,255,21	120,01341
6	36,44580	31,98848	24,29414	84,32019	120,01341	130,16654

Data set without outliers: Covariance matrix for LI enterprises

Year	1	2	3	4	5	6
1	238,94958	170,28142	177,56328	111,24892	61,23538	19,04375
2	170,28142	206,89231	193,58776	116,90979	84,30229	67,70135
3	177,56328	193,58776	230,30131	110,28712	78,73383	67,47738
4	111,24892	116,90979	110,28712	172,47689	81,65176	39,69487
5	61,23538	84,30229	78,73383	81,65176	259,25032	96,34096
6	19,04375	67,70135	67,47738	39,69487	96,34096	221,27044

Data set without outliers: Covariance matrix for CI enterprises

Year	1	2	3	4	5	6
1	100,22212	80,53768	83,19134	64,84213	76,00980	48,35235
2	80,53768	115,45774	122,59635	72,21529	89,91574	44,38110
3	83,19134	122,59635	165,28601	87,00196	100,08308	54,89465
4	64,84213	72,21529	87,00196	122,20213	102,72282	94,95967
5	76,00980	89,91574	100,08308	102,72282	186,78845	118,87237
6	48,35235	44,38110	54,89465	94,95967	118,87237	130,56498

2. Interest-bearing debt to total shareholders' interest

Original data set: Covariance matrix for LI enterprises

Year	1	2	3	4	5	6
1	2939,268	3365,167	3337,195	2801,239	1169,072	1879,882
2	3365,167	4592,310	4697,124	4116,702	1676,752	2349,637
3	3337,195	4697,124	5166,518	4459,060	1763,489	2695,316
4	2801,239	4116,702	4459,060	4372,506	1607,239	2191,291
5	1169,072	1676,752	1763,489	1607,239	1724,560	1161,418
6	1879,882	2349,637	2695,316	2191,291	1161,418	2211,242

Original data set: Covariance matrix for CI enterprises

Year	1	2	3	4	5	6
1	2040,2871	942,6359	937,4248	600,3381	513,4293	344,0874
2	942,6359	635,1543	529,5147	375,9593	401,3399	377,8561
3	937,4248	529,5147	593,1639	402,1949	332,6283	285,3232
4	600,3381	375,9593	402,1949	415,8868	268,6828	268,3754
5	513,4293	401,3399	332,6283	268,6828	995,2510	688,8922
6	344,0874	377,8561	285,3232	268,3754	688,8922	940,4194

Data set without outliers: Covariance matrix for LI enterprises

Year	1	2	3	4	5	6
1	1763,8426	1465,7955	1201,9722	929,6075	696,3872	1042,4213
2	1465,7955	1553,5231	1392,3759	1184,6286	748,3428	1154,7104
3	1201,9722	1392,3759	1465,1900	1266,1285	722,5664	1148,9817
4	929,6075	1184,6286	1266,1285	1608,8966	722,2397	983,8688
5	696,3872	748,3428	722,5664	722,2397	799,6523	812,0280
6	1042,4213	1154,7104	1148,9817	983,8688	812,0280	1336,7078

Data set without outliers: Covariance matrix for CI enterprises

Year	1	2	3	4	5	6
1	905,4222	538,9368	477,0703	355,3436	414,6212	349,7136
2	538,9368	498,9285	369,3361	292,6298	372,7848	388,3376
3	477,0703	369,3361	412,0235	307,2964	296,3397	292,4459
4	355,3436	292,6298	307,2964	371,3662	252,1000	276,0339
5	414,6212	372,7848	296,3397	252,1000	1017,2545	711,2921
6	349,7136	388,3376	292,4459	276,0339	711,2921	971,7384

3. Growth in attributable earnings

Original data set: Covariance matrix for LI enterprises

Year	1	2	3	4	5	6
1	489517,7630	777,4221	2056,9309	–7199,8233	–6683,6063	71777,2930
2	777,4221	33048,0001	–1723,0870	–10749,1616	–25810,0309	10462,8366
3	2056,9309	–1723,0870	28132,909	5233,888	2510,088	–1261,640
4	–7199,8233	–10749,1616	5233,888	11393,110	10123,445	–2780,807
5	–6683,6063	–25810,0309	2510,088	10123,445	639396,715	–10404,521
6	71777,2930	10462,8366	–1261,640	–2780,807	–10404,521	955044,438

Original data set: Covariance matrix for CI enterprises

Year	1	2	3	4	5	6
1	93182,535	–14069,441	–8439,922	–13825,644	9040,552	9575,124
2	–14069,441	20375,098	–5148,969	15068,121	–6954,811	–46787,854
3	–8439,922	–5148,969	72032,158	–13737,240	–13966,783	13898,227
4	–13825,644	15068,121	–13737,240	320481,96	–16500,75	2722,26
5	9040,552	–6954,811	–13966,783	–16500,75	625747,358	8269,807
6	9575,124	–46787,854	13898,227	2722,26	8269,807	172827,750

Data set without outliers: Covariance matrix for LI Enterprises

Year	1	2	3	4	5	6
1	51823,422	11084,998	2837,008	–3849,837	–16413,975	–1089,680
2	11084,998	40001,300	–3158,952	–13940,808	–19602,125	4384,122
3	2837,008	–3158,952	9577,6227	1134,9486	1330,8220	189,8005
4	–3849,837	–13940,808	1134,9486	13096,5103	–163,3666	–173,0868
5	–16413,975	–19602,125	1330,8220	–163,3666	97321,4775	–4224,7518
6	–1089,680	4384,122	189,8005	–173,0868	–4224,7518	3300,6673

Data set without outliers: Covariance matrix for CI Enterprises

Year	1	2	3	4	5	6
1	14385,9150	–1890,8852	2125,7280	–3346,1050	–14059,8861	–26,6369
2	–1890,8852	3270,750	–4727,398	1580,039	2565,444	–1503,006
3	2125,7280	–4727,398	33696,1677	22,3399	–2177,6275	7916,4066
4	–3346,1050	1580,039	22,3399	13970,8794	7014,2444	–1707,5137
5	–14059,8861	2565,444	–2177,6275	7014,2444	62951,513	1984,945
6	–26,6369	–1503,006	7916,4066	–1707,5137	1984,945	50914,1795

4. Price per share to cash flow per share

Original data set: Covariance matrix for LI enterprises

Year	1	2	3	4	5	6
1	115643355	-3397714.0	-12083443	23374876	17396417	86839279.2
2	-3397714	1453200.6	2264822	-500276	2134967	957411.9
3	-12083443	2264821.7	57703489	24514065	4223284	3536845.5
4	23374876	-500276.0	24514065	42138474	11759329	28665984.4
5	17396417	2134966.5	4223284	11759329	1394219267	-189782575.5
6	86839279	957411.9	3536845	28665984	-189782575	134870562.4

Original data set: Covariance matrix for CI enterprises

Year	1	2	3	4	5	6
1	14223152.11	809127.6	80613.09	354251.3	-4663158	356358.59
2	809127.61	3506576.9	471892.52	307473.6	-3994898	-5597184.84
3	80613.09	471892.5	634551.12	416100.4	-2480567	-60091.56
4	354251.34	307473.6	416100.40	4411548.5	3696978	880716.63
5	-4663158.18	-3994898.3	-2480566.91	3696977.6	684212304	3434377.82
6	356358.59	-5597184.8	-60091.56	880716.6	3434378	12965501.44

Data set without outliers: Covariance matrix for LI enterprises

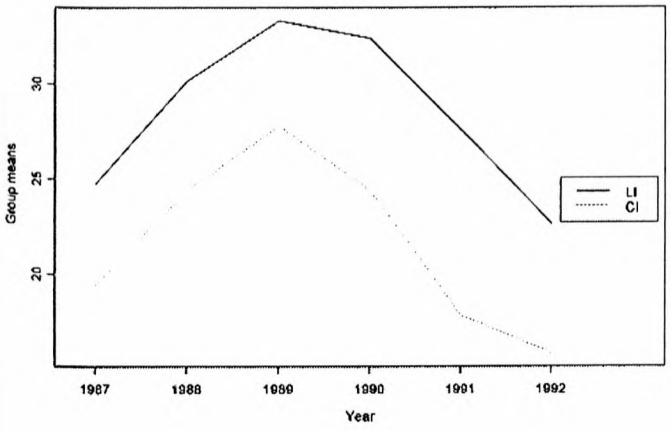
Year	1	2	3	4	5	6
1	2723757.8	223756.5	851466.9	548037.5	1437009.1	267244.5
2	223756.5	1048096.9	1490844.3	263023.6	685430.0	332615.8
3	851466.9	1490844.3	12495576.2	524431.6	2551978.3	3985587.0
4	548037.5	263023.6	524431.6	885317.5	191597.3	769830.1
5	1437009.1	685430.0	2551978.3	191597.3	5647540.2	3483789.8
6	267244.5	332615.8	3985587.0	769830.1	3483789.8	6271139.2

Data set without outliers: Covariance matrix for CI enterprises

Year	1	2	3	4	5	6
1	13982477.4	275850.36	289730.97	105583.1	160796.79	543800.65
2	275850.4	766107.02	518468.59	536933.0	34834.63	6099.15
3	289731.0	518468.59	665266.46	521727.7	156609.44	62658.17
4	105583.1	536933.04	521727.69	4800773.4	314244.81	394813.27
5	160796.8	34834.63	156609.44	314244.8	855012.39	313702.08
6	543800.6	6099.15	62658.17	394813.3	313702.08	1314532.93

Appendix 8B: Mean or adjusted mean profiles of CI and LI enterprises for ratios included in the study covering the individual years of the analysis

X1



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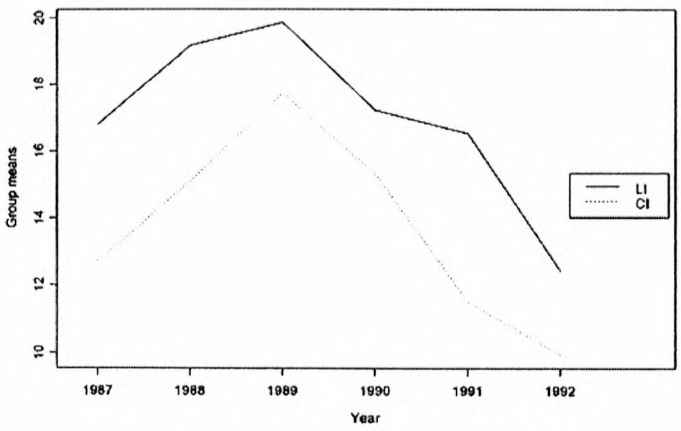

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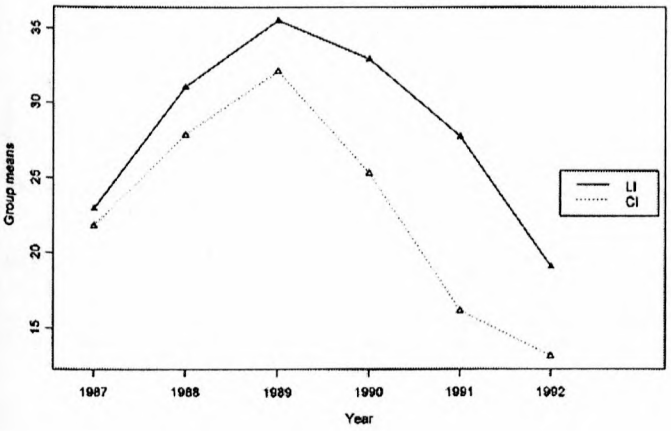

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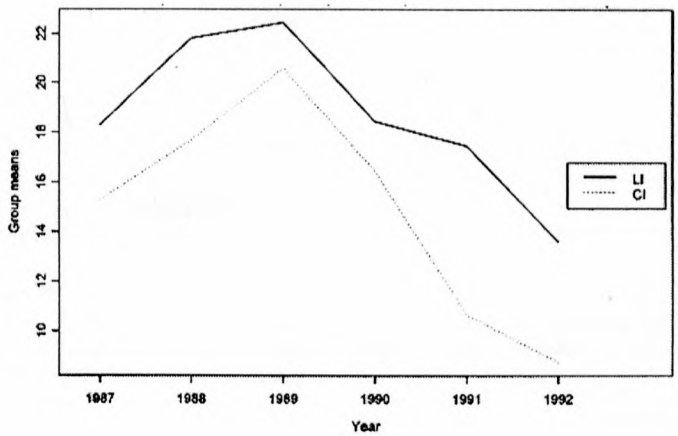

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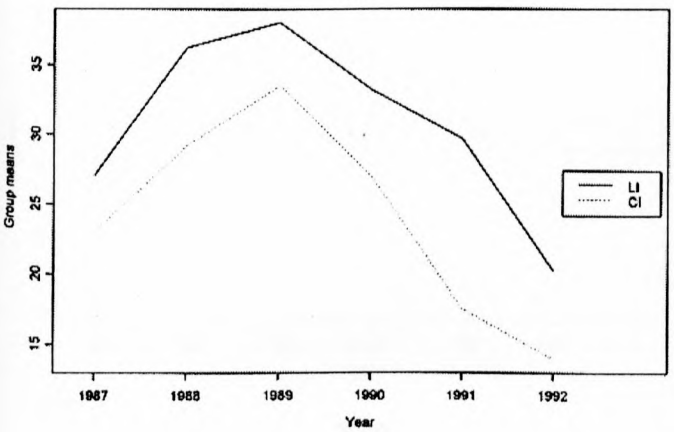

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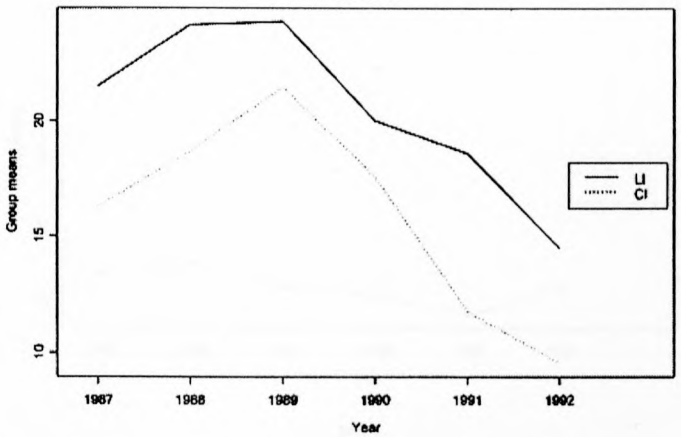

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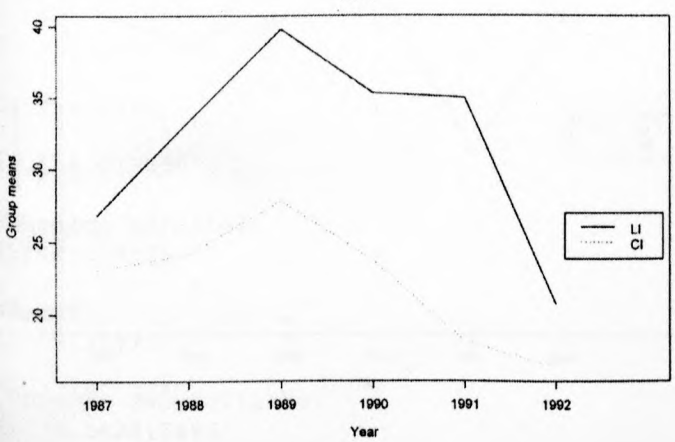

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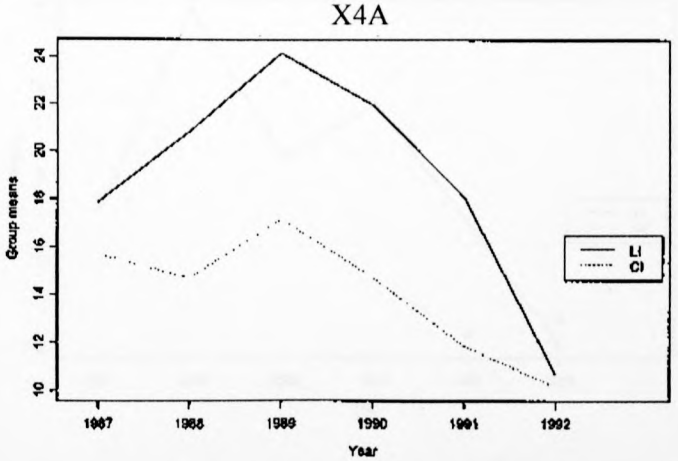

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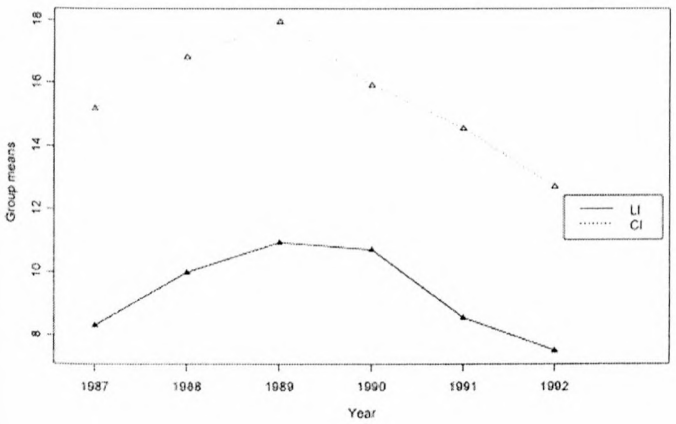

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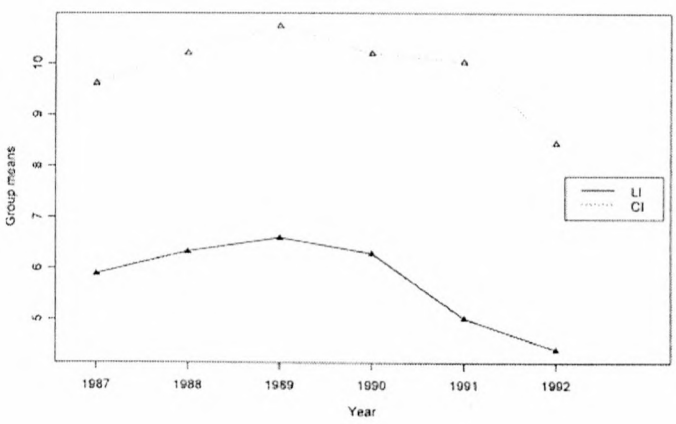

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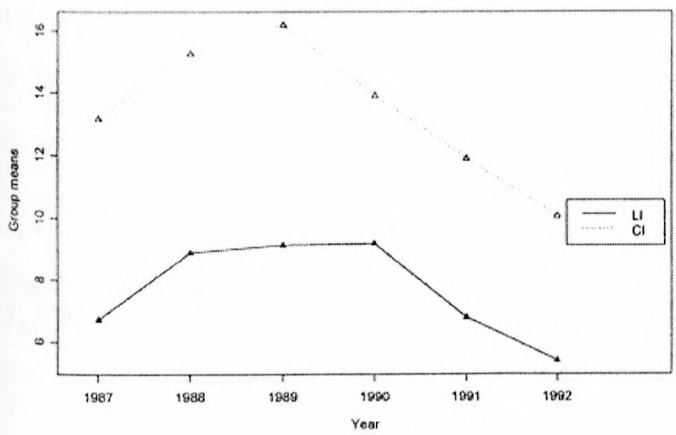

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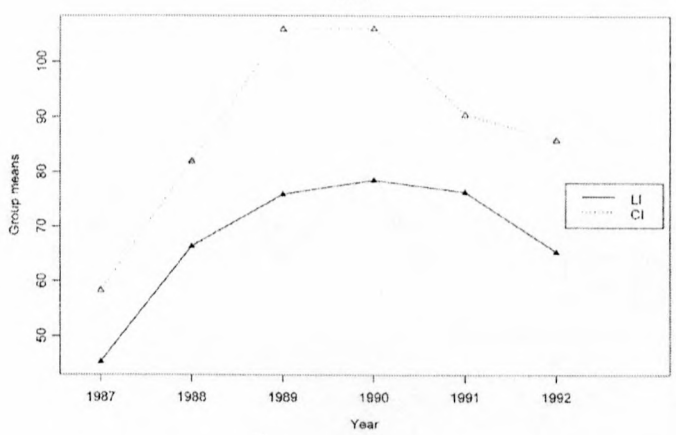

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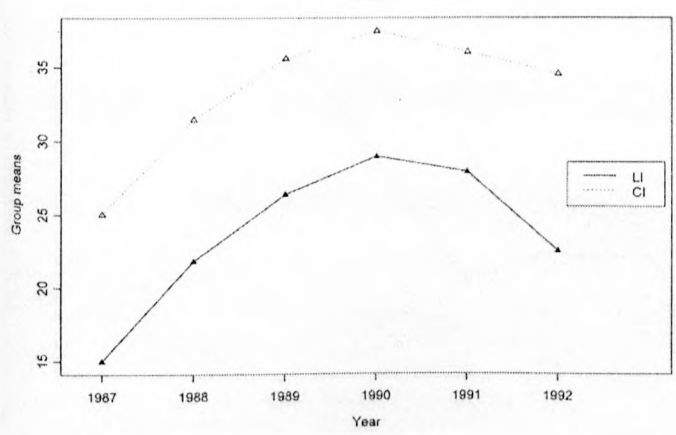

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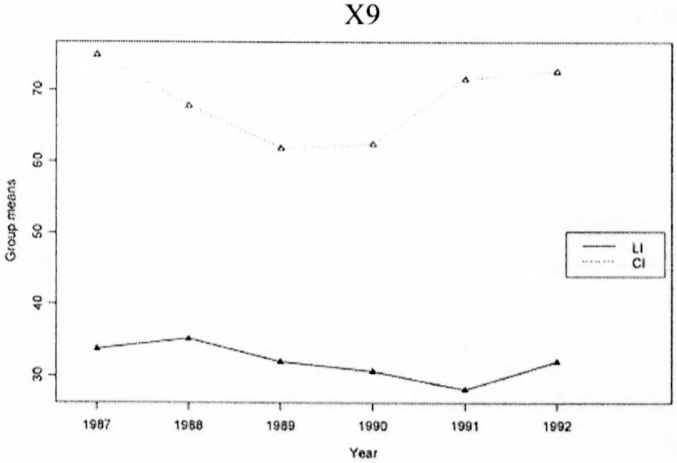

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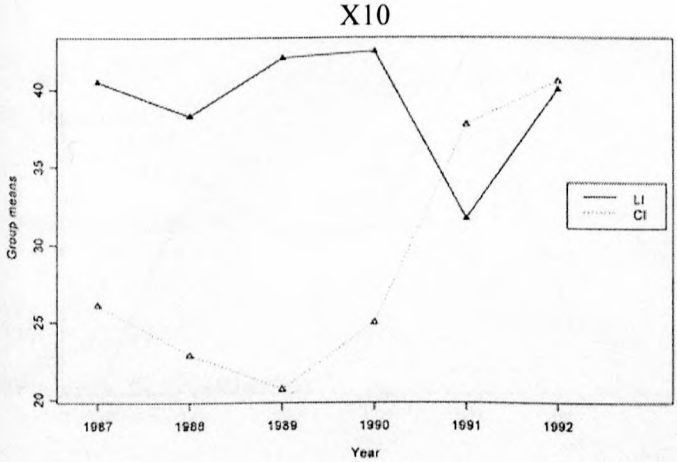

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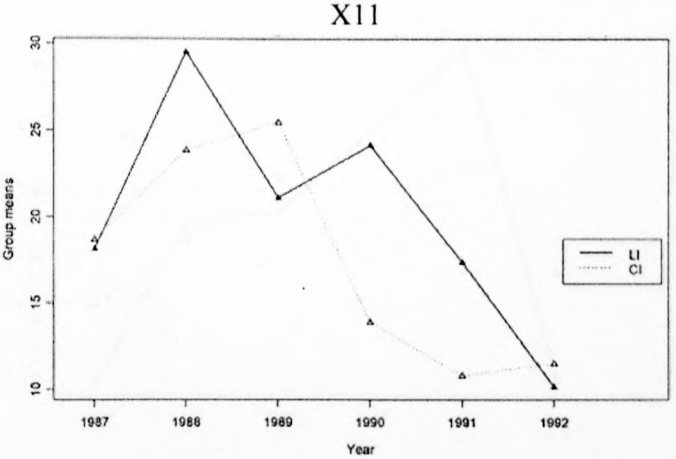

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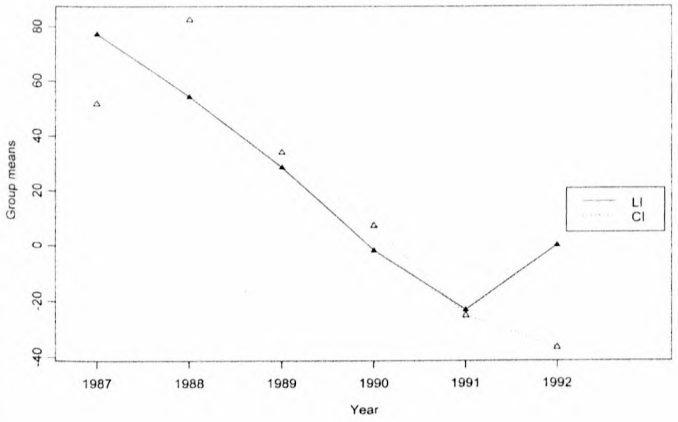

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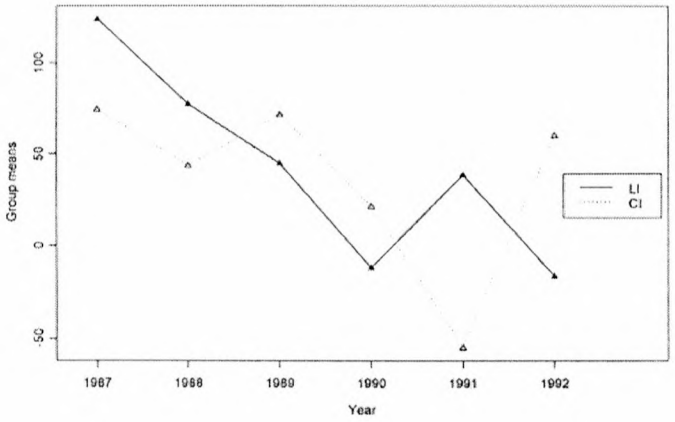

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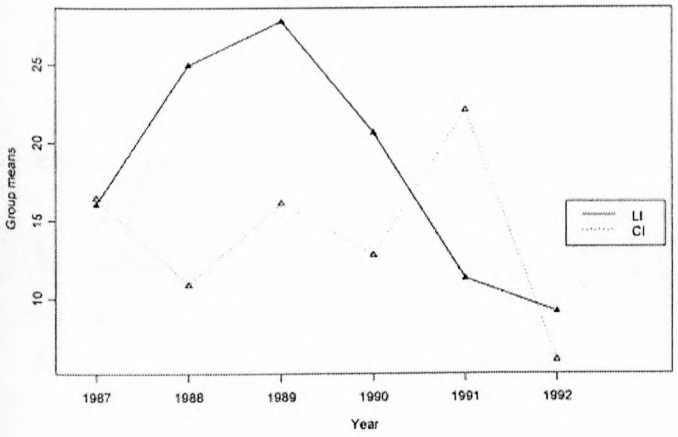

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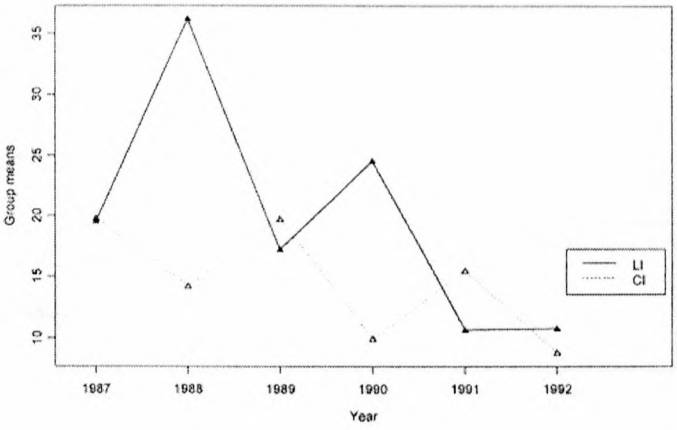

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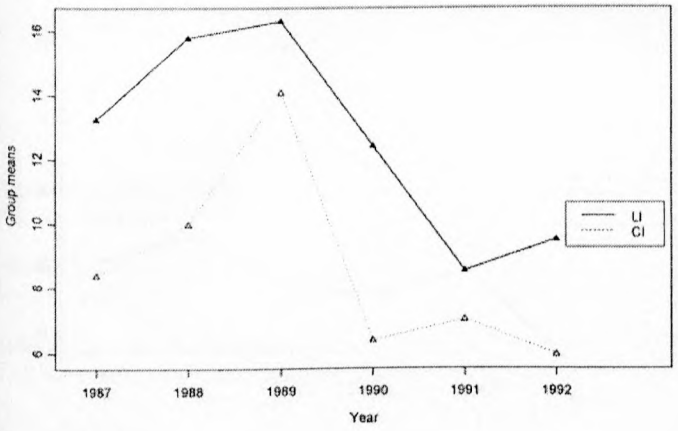

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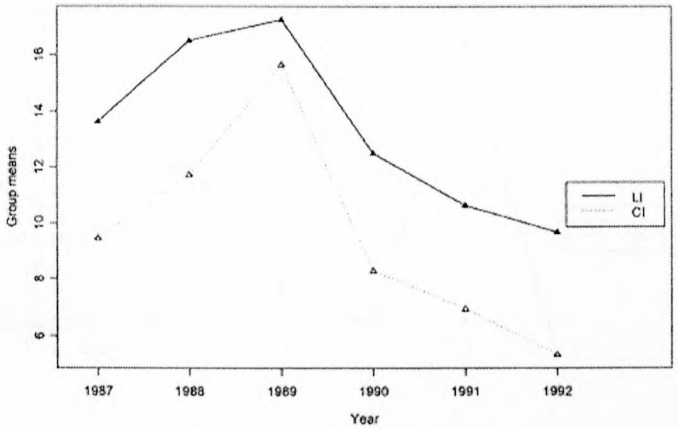

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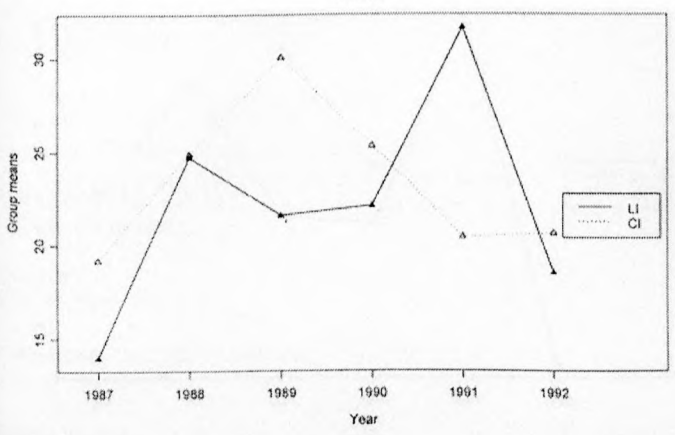

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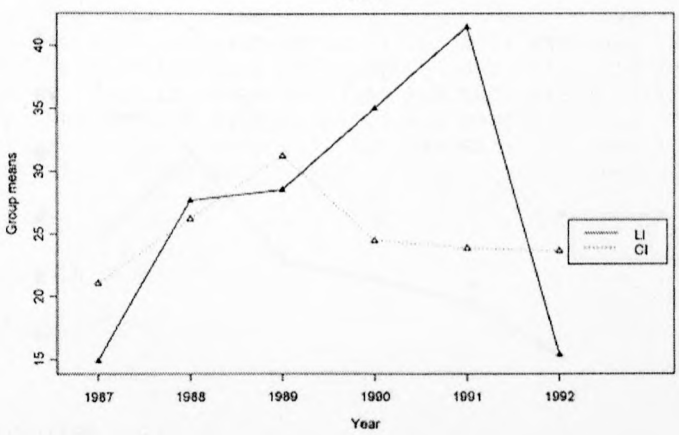

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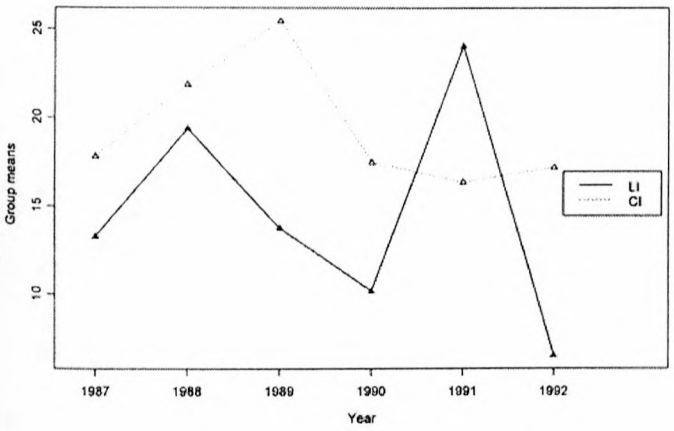

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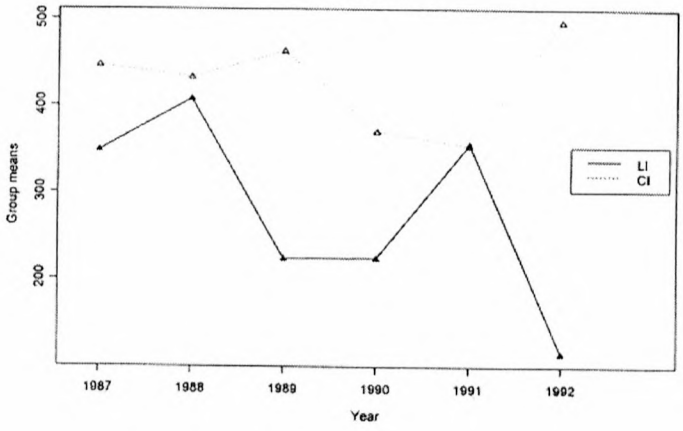

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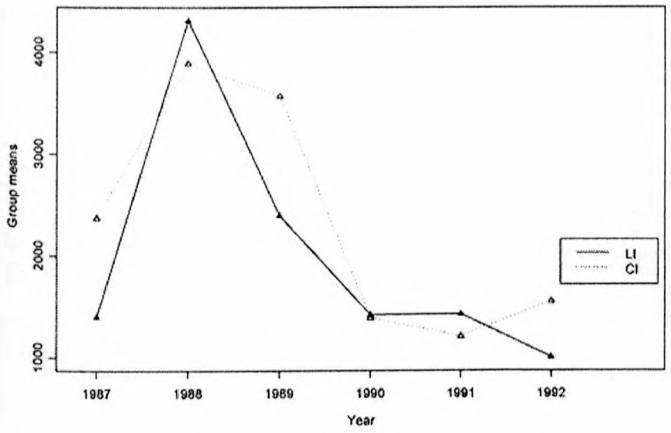

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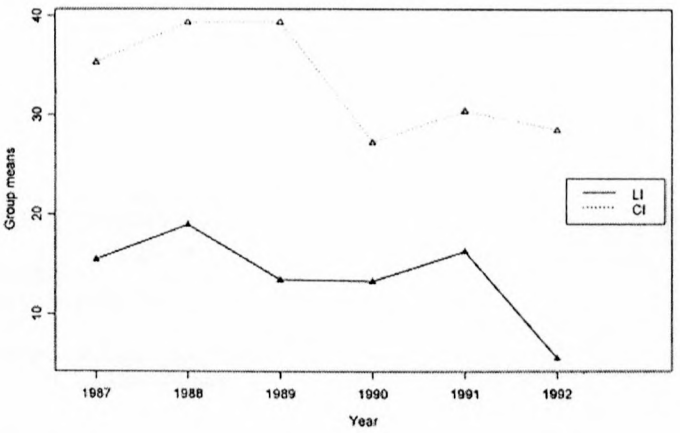

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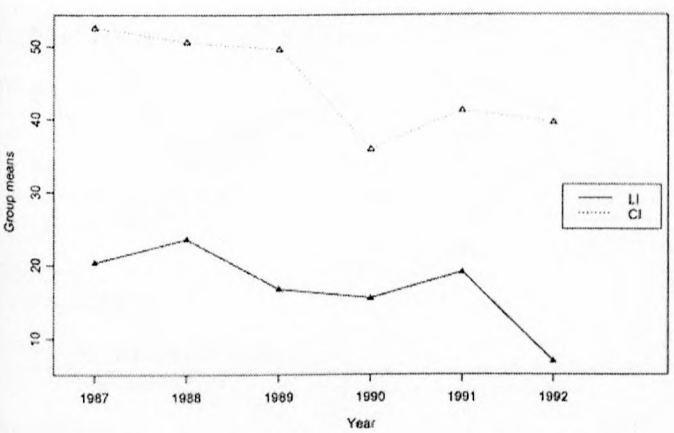

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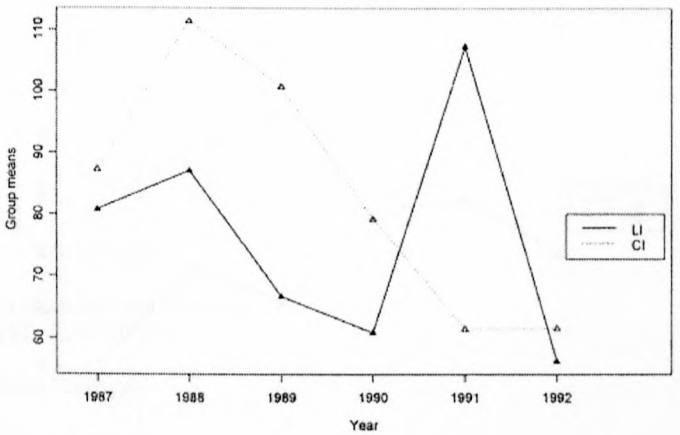

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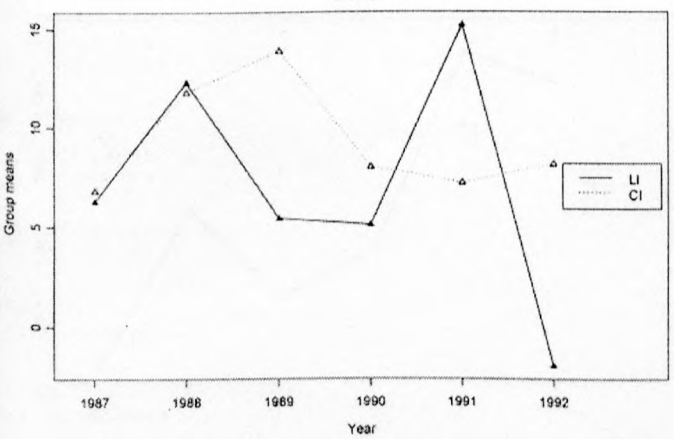

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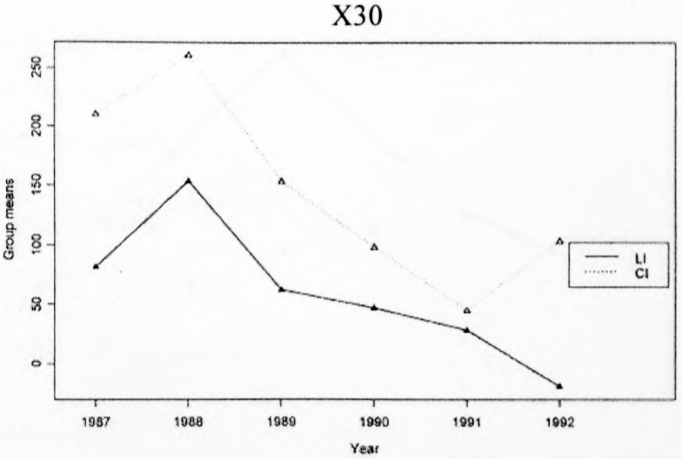

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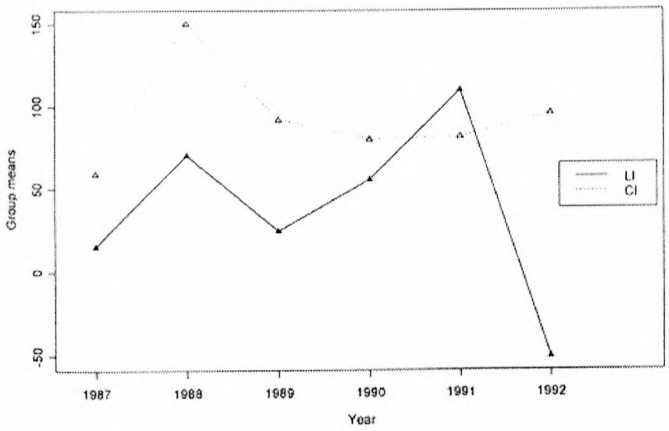

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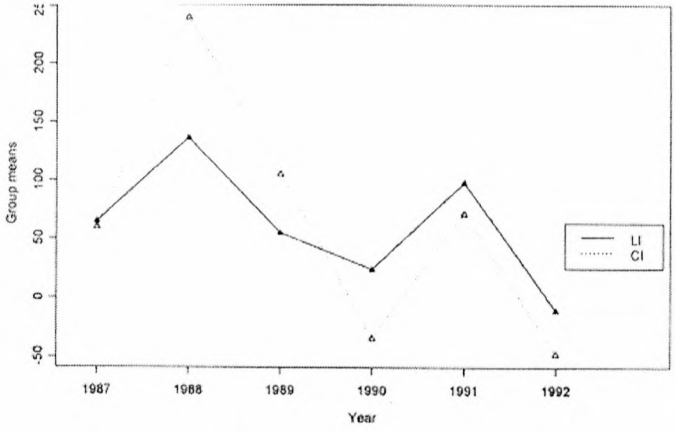

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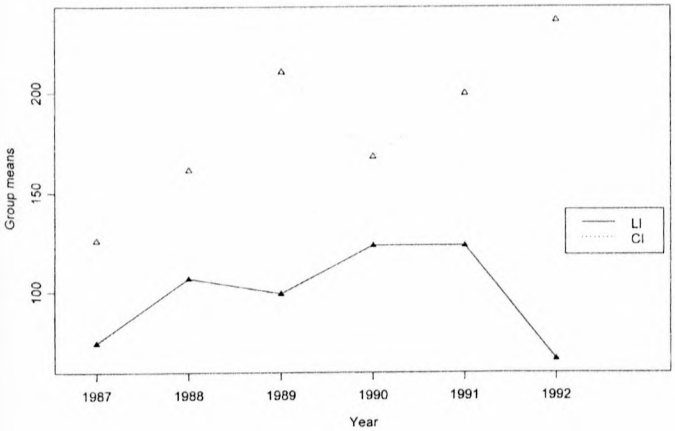

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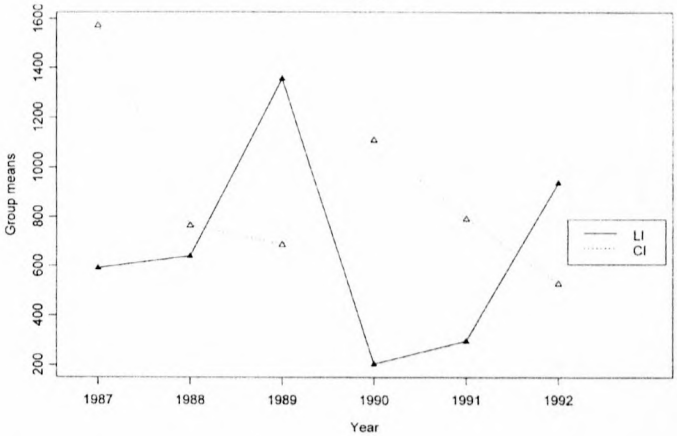

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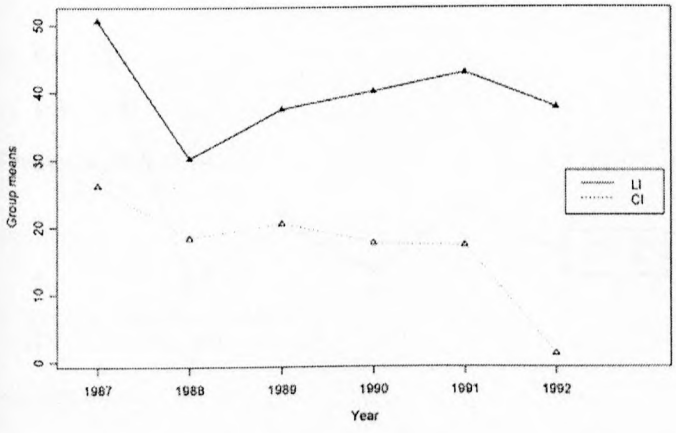

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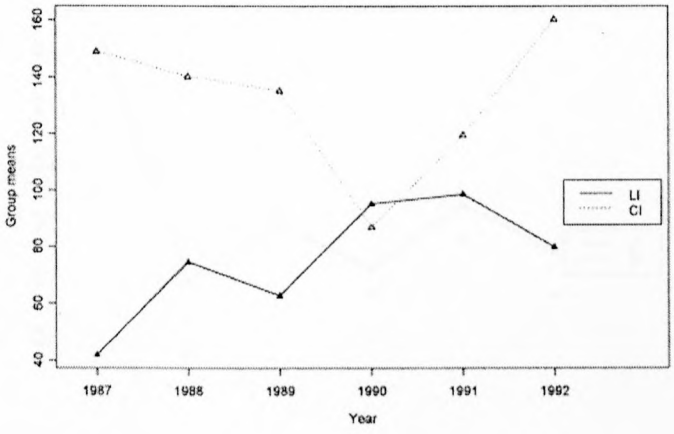

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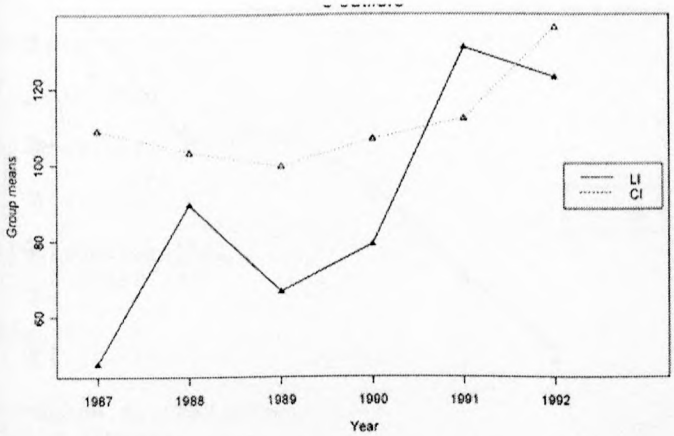

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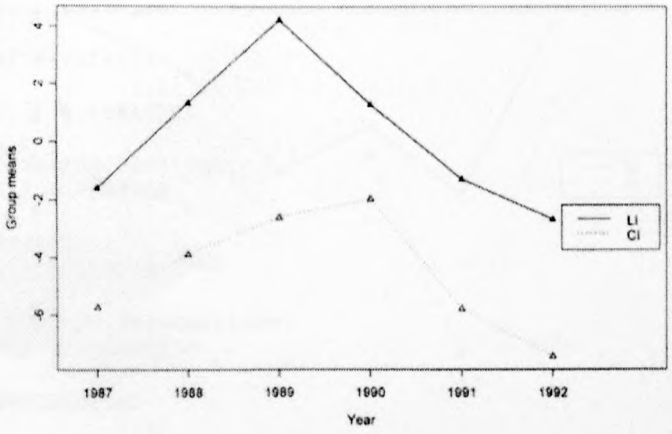

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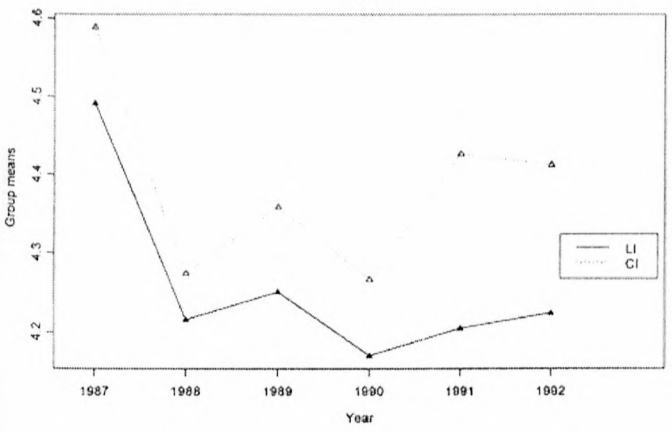

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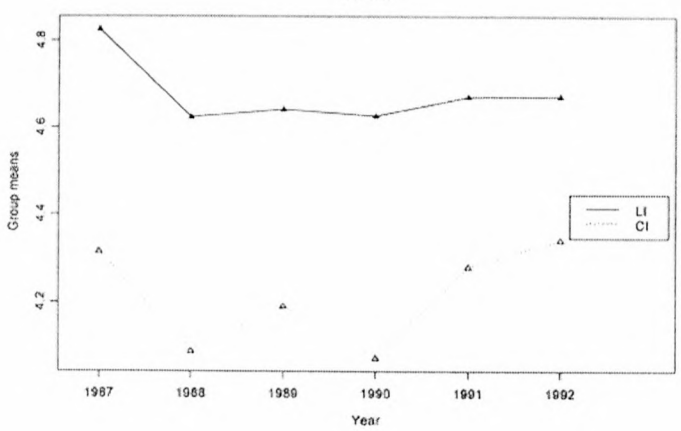

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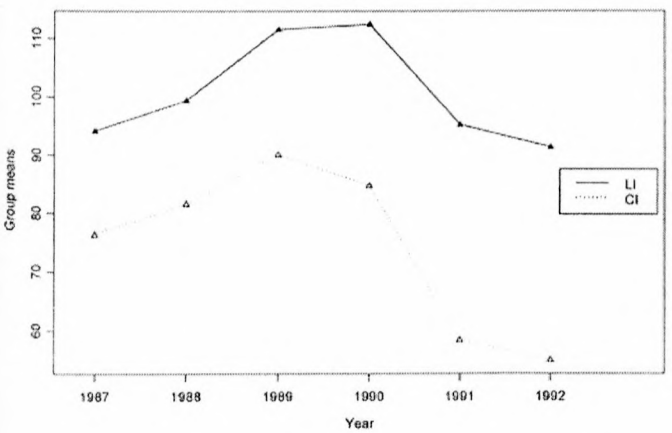

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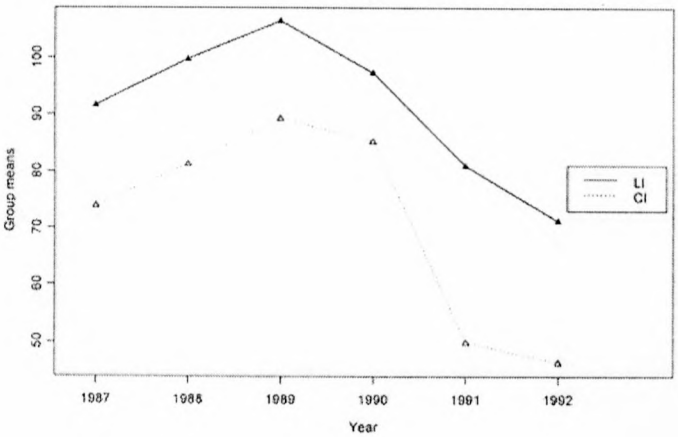

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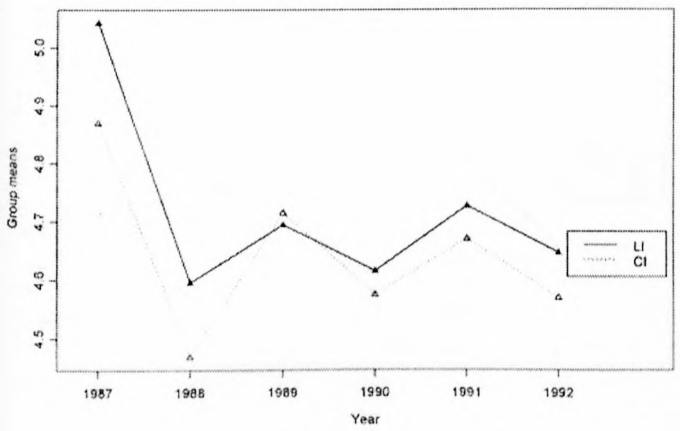

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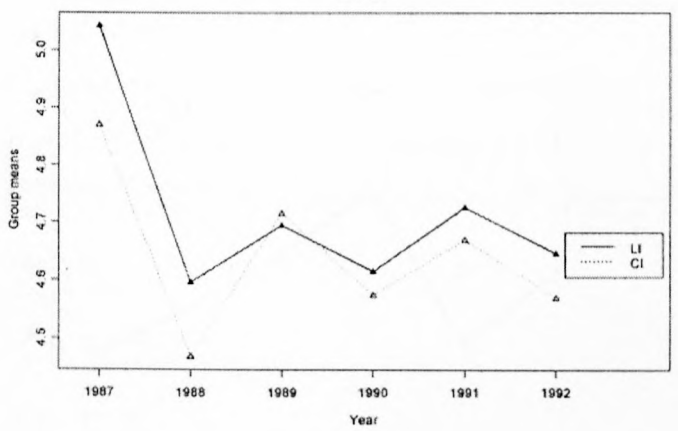

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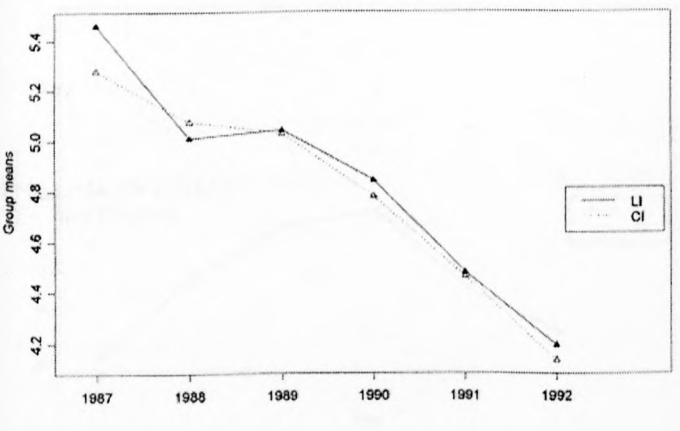

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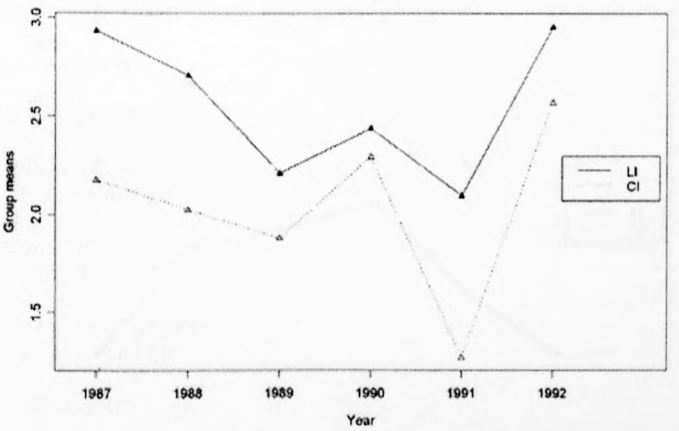

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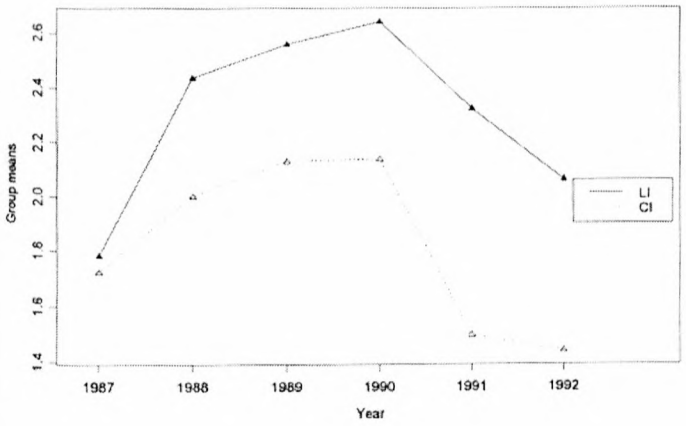

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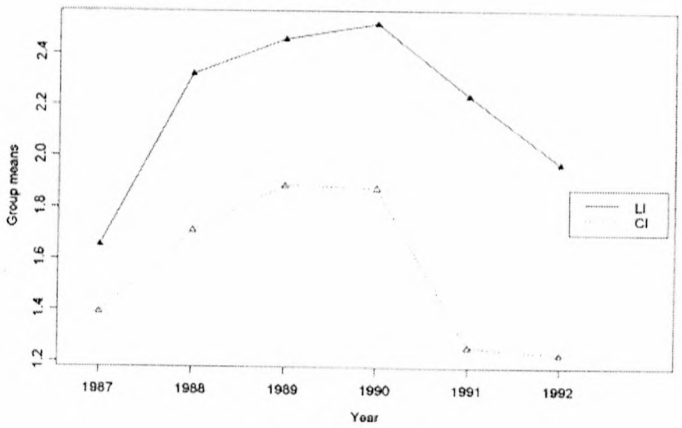

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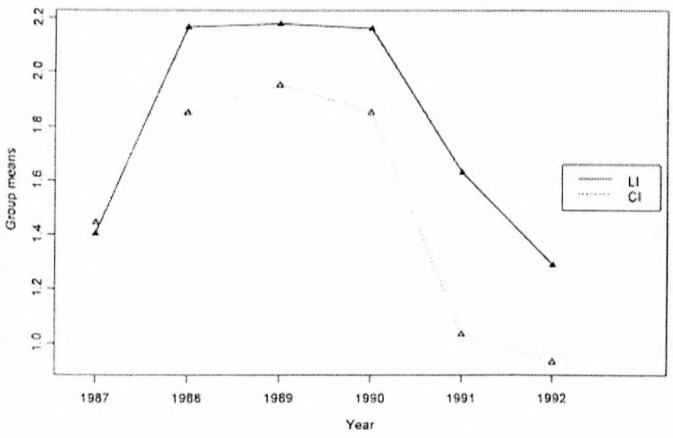

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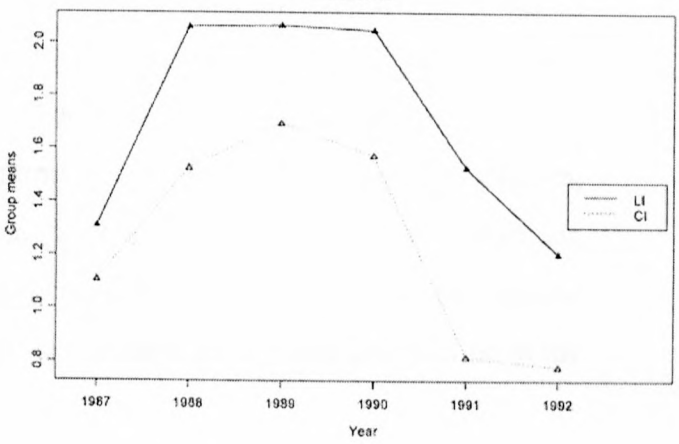

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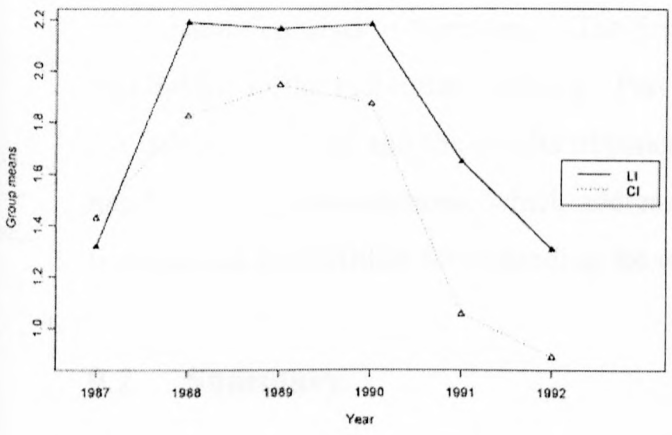

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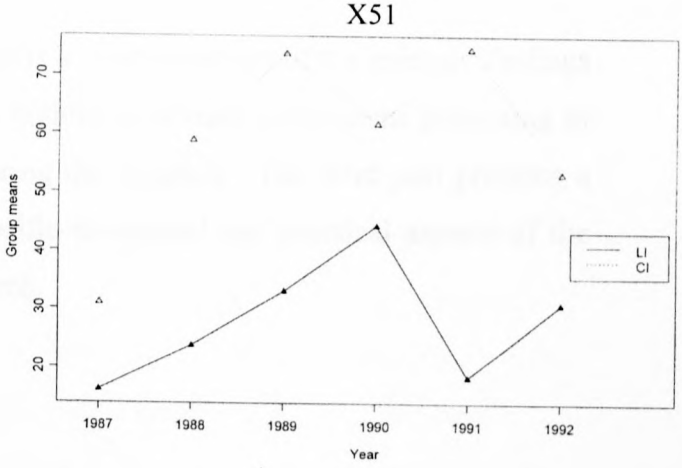

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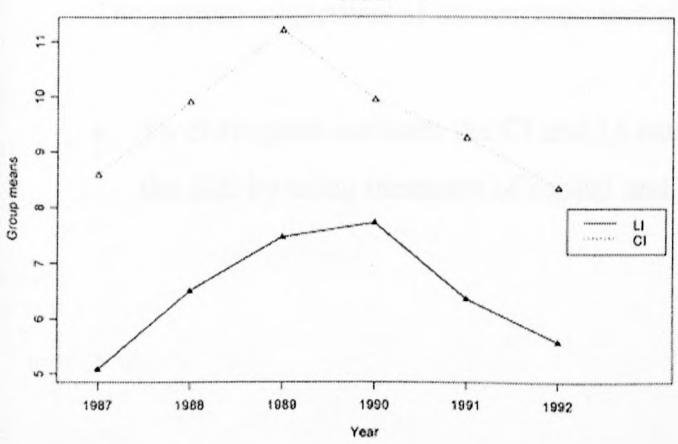

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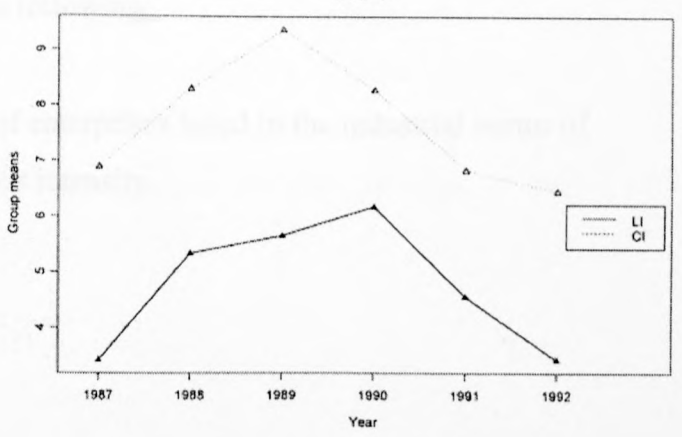

CHAPTER 9

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

An approach which provides a different perspective on the measurement of financial performance is provided in this study. Financial ratios are generally applied to a set of financial statements without taking cognisance of other factors that could affect the outcome of the performance indicators. In order to address this issue further consideration is given to the capital or labour intensive nature of an enterprise's scope of activities. In addition, movements in the economic cycle are also included in the analysis of the ratios to investigate the behaviour of CI and LI enterprises. For the purpose of this study an upswing and decline period, each consisting of three years, were selected to represent an upswing and decline in the economic cycle.

This chapter consists of three parts. The first part is a short summary of the primary findings highlighted in the individual chapters. Part two highlights several conclusions pertaining to the issues identified and the results obtained during the research. The third part presents a number of recommendations, which address specific theoretical and practical aspects of the findings and possibilities for expanding the research.

9.2 Summary

The primary objectives of the research include the following:

- To distinguish between the CI and LI nature of enterprises listed in the industrial sector of the JSE by using measures of capital and labour intensity.

- To obtain patterns and identify differences in the behaviour of selected financial indicators between CI and LI enterprises during an upswing (1987-1989) phase and a decline (1990-1992) phase of the economic cycle, as measured by the GDP.

- To analyse and investigate patterns and differences to determine whether or not there is specific justification(s) for the behaviour exhibited by the CI and LI enterprises for a particular ratio during either or both the upswing and decline phases of the economic cycle.

- To identify key financial indicators which could possibly be used by CI and LI enterprises to forecast financial performance and to identify leads and lags in the economic cycle.

Chapter 1 entails a broad overview of the research presented in the study with the explicit aim of achieving the objectives mentioned above. An overview of the research problem, the specification of primary and secondary objectives, the statement of hypotheses, the scope of the study and a basic outline of the structure of the research are provided in this chapter.

Chapters 2, 3 and 4 provide a theoretical basis for the research by debating the underlying theory regarding the use and relevance of indicators for the measurement of financial performance. This section consists of three chapters. **Chapter 2** provides the basis for an analysis of various aspects related to the traditional measurement of financial performance. Prior to the identification of traditional ratios referenced in the literature, attention is also given to an understanding of financial success measurement, the scope and relevance of financial performance analysis and issues related to maximising the information derived from financial performance measurement. The analysis principally focuses on an evaluation of a selection of literature studies that consider traditional indicators for the measurement of financial performance. It appears that in the research literature over the past seven years traditional financial performance indicators are not necessarily used to analyse financial performance *per se*. More often reference is made to relationships between financial performance and strategic planning, strategy implementation as well as organisational structure and status.

Notwithstanding this, various traditional performance ratios are identified and analysed. Several qualitative evaluation criteria are developed and used to evaluate the identified traditional performance indicators by assigning a score to each ratio based on a criterion. A collective score is obtained for each ratio by adding the individual scores assigned to each criterion for that ratio. This enables each indicator to receive a ranking on the basis of the collective score. A number of relevant ratios could be highlighted in this manner. The qualitative assessment suggests that sustainable growth, return on total shareholders' interest (ROE) and return on total net assets (RONA) could be used to provide useful information about the enterprise's current financial position relative to its competitors or the business sector in which it operates. These indicators highlight both the income-generating ability of the enterprise through the use of available resources and emphasise the capital structure through the use of the sustainable growth rate, which considers both internal and external capital requirements. Other traditional performance indicators should complement and supplement the proposed mainstream indicators. In addition, several key issues related to traditional financial performance measurement are highlighted to emphasise both the limitations and positive aspects of using traditional performance indicators. These issues include the lack of dynamism in traditional performance analysis, an over-emphasis on traditional financial performance measurement in practice and the superficial insight provided by traditional performance indicators.

Chapter 3 highlights the usefulness, relevance and need for cash flow analysis as a part of financial performance measurement. The discussion complements the analysis of financial performance measurement provided by the traditional approach in Chapter 2 by emphasising additional indicators for financial performance measurement.

Prior to the evaluation of the identified and selected cash flow indicators, the concept of cash flow is analysed by emphasising the difference between cash and accounting earnings, and an analysis of the funds flow related to the inflow and outflow of five cash components identified in the cash flow statement is provided. In addition, the effect of cash flows on financial success and failure is emphasised and the relevance of a cash flow performance index to analyse cash inflows and outflows over time is proposed.

Each cash flow ratio identified and selected from the literature is also analysed individually and classified in terms of its usefulness for enhancing specific activity-based decision-making areas of the enterprise before a similar qualitative assessment procedure as applied in Chapter 2 is used to evaluate the selected cash flow ratios. A critical evaluation of the selected cash flow performance indicators after the pre-sifting phase is conducted through the application of pre-determined qualitative criteria. The qualitative assessment of the cash flow ratios highlights the importance of using more general cash flow indicators for performance measurement. The results of the analysis indicate that the funds position indicator, cash flow return on total net assets and the coverage ratio could be considered as mainstream performance indicators. Cash flow return on total shareholders' interest, cash flow per share and the re-investment ratio are indicators which should supplement the three mainstream indicators. Financial indicators such as cash flow to total debt, cash flow to turnover and growth in cash flow from operations could be used to further complement and provide more insight into the financial position of the enterprise as highlighted by the mainstream indicators.

An assessment of value provided in **Chapter 4** focuses on the prominence, relevance and usefulness of value-based financial performance analysis. An initial assessment of value-based performance includes an understanding of the concept and relevance of value and its linkages to performance measurement, and a discussion of interrelated value determinants such as RONA, ROE, weighted average cost of capital (WACC) and cost of equity (K_e). To further embroider on value analysis, the Shareholder Value Approach, the relationship between sustainable growth and ROE and the effects of growth in an enterprise on value creation and destruction is also highlighted. A concise evaluation of the operational value added statement is also provided.

The primary focus of this chapter, however, is a critical analysis of the information content of selected value indicators. Several evaluation criteria not unlike those applied in Chapters 2 and 3 are used to assess the relevance of value indicators for financial performance measurement. It is noted that just more than half of the indicators are forward-looking and are based on shareholder sentiment and perceptions, while the remaining indicators highlight management's ability to enhance capital returns and minimise capital costs. The combined qualitative assessment scores for each ratio derived from the application of the evaluation

criteria to the selected number of ratios indicate that market value added (MVA), economic value added (EVA), warranted equity value (WEV) to book value of equity (BVE) and Tobin's Q-ratio could be considered as mainstream indicators of value performance. The remaining value indicators, such as the profitability indices (RONA:WACC and ROE:K_e ratios) and the value indices (market to book ratios and the ROE (after tax) to earnings yield), could be regarded as complementary indicators during an assessment of value.

The latter part of Chapter 4 highlights several specific issues related to the use and application of value performance indicators, i.e. linkages with other approaches to financial performance measurement, and value analysis as a key element of corporate strategy and performance measurement.

Chapters 5 through 8 convey the methodology and findings of the primary research conducted as part of the study. A brief overview of the research design is presented in the first part of **Chapter 5**, while the research methodology is discussed as part of the relevant chapter. The second part of the chapter provides a brief analysis of the economic cycle which is used to determine a period for the research. Economic activity in this study as measured by the annual GDP (at constant 1995 prices) as quoted by the South African Reserve Bank is used as an indicator of movements in the business cycle over the period 1987 to 1992. A neutral year occurred in the South African economy during 1986 in which no increase or decrease in economic growth was achieved. The research period following on the neutral year is therefore composed of three positive growth years (1987-1989) and three negative growth years (1990-1992).

The latter part of Chapter 5 focuses on the classification of enterprises listed in the industrial sector of the JSE as capital intensive (CI) or labour intensive (LI). The aim of the classification is to obtain independent groups of enterprises that are used in the analysis conducted in Chapters 7 and 8. In order to distinguish between CI and LI enterprises, two financial measures, NFA:TA and NFA:EMP, are considered. These measures are considered because in the literature both are used as indicators of the CI nature of an enterprise's activities. The use of NFA:TA would indicate the level of capital intensity, but little indication is provided by the measure as to the labour intensity, while NFA:EMP indicates the labour intensity of processes, but not necessarily the level of capital intensity. The rationale is

therefore to consider both measures in combination as a single measure of capital intensity versus labour intensity.

A logarithm of the NFA:EMP for each enterprise is used to bring the larger and smaller values for the ratio closer together, after which both measures are standardised to enable comparisons. Both the standardised NFA:TA and standardised (log NFA:EMP) classification measures are firstly considered on a one-dimensional basis, i.e. individually and then in combination. By using the standardised NFA:TA measure and the application of the criteria discussed previously, it is possible to select 37 of the provisional number of enterprises with a standardised NFA:TA value outside the interval [–1,0 ; 1,0]. Furthermore, 20 of the enterprises included on this basis could be considered as low CI, while 17 of the enterprises are inclined to indicate a high capital intensity. Furthermore, 32 enterprises have a standardised (log NFA:EMP) value outside the interval [–1,0 ; 1,0]. A total of 19 of the enterprises are inclined to exhibit a low labour intensity, while 13 of the enterprises could be considered to have a high labour intensity.

A correlation between the two individual classification measures indicates a coefficient of 0,72. However, a correlation of 0,72 implies that 48,2% of the variation in one of the variables is not accounted for by the other one through a linear regression relationship. The scale constructed from the Euclidean Distance associated with the two ratios, which measure different aspects of the enterprise's activities, differentiates between CI and LI enterprises. The scale values for enterprises included in the analysis range from –2,8957 to +3,7562. On the basis of this scale a positive value indicates a CI enterprise and a negative value a LI enterprise. An enterprise is considered more CI the larger (or more positive) this scale value becomes and more LI when the scale value becomes smaller (or more negative).

By using a base-line criterion of an upper and lower 25,0% of the scale values, an enterprise which has an Euclidean Distance of larger than 0,95 and smaller than –0,95 is classified as CI or LI respectively. In the final analysis 33 of the 69 enterprises could be considered as CI and 36 as LI. The contribution of each JSE-classified sector to the inclusive number of 69 CI and LI enterprises indicates that Building, Construction and Allied contributes 24,2% of the enterprises, followed by Chemicals, Oils and Plastics with 15,1%, while Clothing and Textiles and Beverages, Hotels and Leisure each contribute 12,1% of the enterprises to the CI group.

Conversely, Clothing and Textiles contributes 30,5% of the enterprises followed by Wholesale and Retail with 25,0% to the LI group, while Furniture and Household contributes 11,1% of the enterprises to the LI group.

Chapter 6 provides details of the systematic procedure adopted to calculate the financial performance indicators used in the study. The selected traditional, growth, cash flow, value and inflation-adjusted ratios identified and analysed in Chapters 2 to 4 are used in the analysis. Once the ratios are selected, the financial statement data required for the calculation of the indicators are obtained from the Bureau for Financial Analysis, University of Pretoria database (BFA-NET) for the two groups of CI and LI enterprises. Several intermediate procedures are used to obtain clarity on the standardisation method, the best manner possible to adapt the standardised financial statements for user-defined requirements and the identification of a master enterprise for test and control purposes.

A user-defined set of financial statements, which includes a balance sheet, income statement, cash flow statement and an inflation-adjusted income statement and balance sheet, are compiled. The BFA-NET financial statements and sundry items were used together with user-defined sundry items to compile the user-defined financial statements for each selected company. SAFREN Ltd is used as the control (test) enterprise for the manual and electronic calculations of the ratios. The 69 companies required for the research and listed in the BFA-NET database are downloaded in Excel format. The formulae for the ratios of the master company SAFREN are also programmed in Excel format, which facilitated the application of the master enterprise to all the other enterprises included in the research. In order to compile the processed data in an acceptable format for use by the analytical software, nine data matrices (62 by 69) are compiled, one for each year of the analysis and two based on a single representative measure, which is the average of the three-year upswing and three-year decline phases of the economic cycle.

The analysis of the economic cycle and the selection of a period that resembles an upswing and decline phase in the economy, together with the compilation of CI and LI groups of JSE industrial enterprises are provided in Chapter 5. These aspects, together with various ratios identified and analysed in Chapters 2 to 4 and the calculation process discussed in Chapter 6,

form the basis of the statistical analysis and the interpretation of the results from the financial management perspective provided in Chapters 7 and 8.

The analysis and findings presented in **Chapter 7** distinguish between the behaviour of indicators relevant for analysing financial performance in CI and LI enterprises during either or both an upswing or decline phase of the economic cycle. A linear graphic representation of the median and notched box and whisker plot for each performance indicator is compiled for the CI and LI enterprises during the upswing and decline phases. The median graphic representations based on a single representative measure are used to classify the ratio patterns into one of six groups based on the behaviour of the CI and LI enterprises during the upswing and decline phases of the economic cycle. The results of the analysis indicated six primary groups of median patterns, i.e. "declining", "declining intersecting", "upward", "torch"-shaped, "funnel"-shaped and "scissors"-shaped. Median patterns in the "declining" group occur frequently for profitability, growth, value and inflation-adjusted ratios, while the cash flow ratios exhibited a diverse range of median patterns. The majority of the median patterns exhibited by the ratios are to be expected. However, several median patterns were contrary to what is to be expected.

A total of 61 of the 62 ratios initially included in the study are analysed in the first part of the Chapter 7. The single ratio, growth in operating cash flow (X19) could not be used due to an insufficient number of data points. Similar patterns are exhibited by 45 of the ratios, while 16 indicated opposite patterns. Within the group indicating similar patterns, 21 exhibit patterns that could be considered as "differences of degrees". These patterns refer to two types of declining patterns and two types of upward patterns (see section 7.4.1 of Chapter 7). An initial analysis of the median patterns suggests that 37 (opposite and "differences of degrees" patterns) may indicate statistically significant differences. The remaining 24 ratio patterns are not expected to indicate differences between the CI and LI enterprises. However, the possibility of statistically significant differences could not be precluded.

The median plots together with the notched box and whisker plots are used to determine preliminary differences between the CI and LI groups of enterprises during an upswing and decline period in the economic cycle. The results of the Exploratory Data Analysis (EDA) indicate that nine financial performance indicators suggest statistically significant differences

between CI and LI enterprises during either or both the upswing or decline phases. The analysis further indicates that five indicators (one profitability, three cash flow and one inflation-adjusted ratio) emphasise preliminary differences between CI and LI enterprises for both the upswing and decline phase. In addition, four cash flow indicators suggest statistically significant differences between CI and LI enterprises during either or both the upswing or decline phases.

Five of the opposite patterns (three cash flow, one value and one inflation-adjusted ratio), which are expected to indicate statistically significant differences between CI and LI enterprises, form part of the group of ratios that suggest possible statistically significant differences. The remaining four median patterns (two profitability, one cash flow and one inflation adjusted ratio) indicate statistically significant differences between the CI and LI enterprises which are not entirely expected. The substantially higher level of the ratio for one group when compared to the other appears to cause these statistically significant differences.

The latter part of Chapter 7 provides an analysis of the statistically significant differences between CI and LI enterprises during an upswing and decline phase of the economic cycle as exhibited by the behaviour of the financial performance indicators. A total of 59 of the ratios included in the study are used for this part of the analysis. Mean profiles for all the indicators are compiled in order to complement the median profiles analysed in the first part of Chapter 7. The median and mean profiles are used together with a 5% and 10% trimmed mean to identify the presence of outliers among then CI and LI enterprises. This enables an identification of those ratios where the mean and median profiles are similar and those that indicate different profiles. For those ratios which contain possible outlier values, it is acceptable to use non-parametric statistical techniques, which include the Mann-Whitney U-test and Wilcoxon matched-pairs test to determine statistically significant differences between CI and LI enterprises for the upswing and decline phases as well as between the upswing and decline phase for either the CI or LI enterprises respectively.

Of the 59 ratios analysed, 26 indicators appear to have no outlier values. For these ratios it is possible to conduct a profile analysis based on Hotelling's T^2 test. This test accepts that the applicable ratios are assumed to have approximately normal distributions and further implies that the upswing and decline phases have the same effect on the CI and LI enterprises for a

particular ratio. It is also possible to determine whether or not statistically significant differences occur between LI and CI enterprises for the upswing and decline phases separately. A profile analysis of the CI and LI profiles suggests that for a given set of mean profiles it is possible to pose three questions underlying the sample data: Are the CI and LI profiles parallel? If the CI and LI profiles are parallel, it is possible to determine whether or not the profiles are coincident. Also under the acceptance of parallelism, it is possible to determine whether or not the profiles are horizontal, irrespective of the CI and LI nature of the enterprises.

The results of the mean profile analysis indicate that more ratios in the profitability group suggest statistically significant differences between CI and LI during the upswing phase than the decline phase when compared to the other categories of ratios. Fewer indicators highlight statistically significant differences between CI and LI enterprises during the upswing period in each of the ratio categories. The same results are obtained for the LI and CI enterprises during the decline period. The mean profile analysis results indicate that 11 of the 26 ratios that are assumed to exhibit approximately normal distributions suggest that the upswing and decline phases do not have the same effect on the CI and LI enterprises.

The above results from a financial management perspective indicate that working capital requirements have a lesser effect on CI enterprises during the decline phase, while working capital increases substantially for LI enterprises during the decline phase due to pressure placed on stock levels and debtor payment periods. Adjustments in fixed assets in line with sales among CI enterprises are a possible cause of the statistically significant differences between the CI and LI enterprises during the upswing and decline period. Cash requirements also differ between CI and LI enterprises during the upswing and decline phases. Sales growth and subsequently income increases at a faster rate among CI than the LI enterprises during the upswing phase. Depreciation written off differs between CI and LI enterprises during the decline period when monetary and real RONA are considered. The larger write-off of fixed assets by CI enterprises indicates a sharper reduction in operating income during the decline phase.

The findings presented in Chapter 7 confirm the necessity to interpret the results in the context of the following aspects, several which are considered in Chapter 8. Firstly, CI and LI

enterprises may not react immediately or simultaneously to an upswing or decline in the economic cycle. In other words, the period of the lag (if any) may differ between the groups of enterprises. Secondly, the upswing and decline period each cover three years. Should a large value be present in any one of the three years during the upswing or decline phase, a median pattern may be obtained which is contrary to what is expected due to the use of average values. Thirdly, the behaviour of the enterprise or, alternatively, the manner in which the enterprise reacts to an upswing or decline phase is not necessarily considered in the same context as the reaction of the economy to a decrease or increase in levels of production. For instance, an enterprise may continue to follow its dividend policy, which may be to increase dividends by the inflation rate each year. This will account for an upward pattern in the dividend per share. Fourthly, the shape of the median pattern may be misleading and in essence the anticipated difference exhibited by the plot is actually negligible if the scale is considered. Consequently, it is necessary to statistically investigate the differences between the CI and LI enterprises over the upswing and decline phases.

The results presented in **Chapter 8** are based on the analysis of the ratio data for the CI and LI enterprises based on the individual years of the research period. The analysis in Chapter 8 is based on 57 of the ratios initially included in the study. The mean and median of each ratio are calculated for the CI and LI groups for each year of the analysis. This is to overcome the limitations of using a single representative measure as discussed in Chapter 7. An initial analysis of the mean and median patterns indicates the presence of outliers among a large number of the ratios. A more in-depth analysis of possible outliers was conducted by visually investigating the scatterplots of the means for each year in an interactive manner. This was accomplished by using the "brush" functionality of the S-PLUS statistical software package in a manner which also enables the removal of data points considered visually to be outliers. Adjusted-mean patterns with the outlier values excluded are also compiled. If the mean and median patters are similar, it is possible to conduct a profile analysis of the CI and LI profiles.

The pattern of each indicator was analysed over the entire period of the study. On the basis of its pattern, each ratio was assigned to a pre-determined group of patterns, i.e. normal expected patterns, lead patterns, lag patterns, cyclical patterns and mixed patterns. The discussion of each category of patterns focuses, firstly, on the statistical analysis of the patterns and,

secondly, on the financial interpretation of the patterns for the CI and LI enterprises during the upswing and decline phase of the economic cycle.

Most of the ratios included in the study exhibit normal expected patterns. Of the 26 ratios that exhibit increasing normal expected patterns, 12 are classified as profitability and this further represents 80% of the traditional profitability group of ratios. The traditional profitability indicators often used for ascertaining the financial performance of enterprises include RONA, RNOA, ROE and EVA and form part of this pattern group. All the ratios in the inflation-adjusted category exhibit normal expected patterns. The generally quoted ratios for the CI and LI enterprises also exhibit similar patterns to the upswing and decline phases of the economic cycle. In addition, two growth, three value and nine inflation-adjusted indicators also form part of this group. A total of 24 (92%) of the 26 ratios relate either directly or indirectly to the profitability of the enterprise.

Only seven (12%) of the 57 financial ratios exhibit decreasing lead median patterns. None of the ratios in either the profitability or the inflation-adjusted groups indicate any lead patterns. The value category indicates four ratios, the growth category two and the cash flow category one. The ratios that indicate lead patterns are particularly relevant because they may provide an initial indication of the ratio being able to lead the economic cycle. Ratios that exhibit lead patterns could possibly be used to forecast financial performance.

Only one ratio exhibits a strong lag pattern for both the CI and the LI enterprises. However, ratios that exhibit a lag pattern for either the CI or LI enterprises are grouped in the mixed pattern category. The price per share to cash flow per share is the only ratio that exhibits a cyclical median pattern.

The remaining 22 (39%) financial ratios used in this section of the analysis exhibit mixed mean, adjusted mean or median patterns. The mixed pattern category also represents the second largest group of ratios. Of the 22 ratios, two are classified as profitability, three growth, 15 cash flow and two value indicators. The patterns based on the median are used for financial analysis of CI and LI enterprises for 17 of the ratios, while the adjusted mean is used in the remaining five cases. Among the 22 ratios, eight are based on total net assets or components of total assets. It is of interest that 15 of the 18 cash flow ratios used in the study

exhibit mixed patterns. This finding should also be considered in the context of the limited use of cash flow indicators by large enterprises for financial decision-making and forecasting. Furthermore, the sharp fluctuations and sensitivity often associated with cash inflows and outflows occur because the figures are based on actual values as opposed to accumulated figures as per the balance sheet.

The following section considers the patterns exhibited by the CI and LI enterprises of important financial ratios generally used to determine financial performance and their reaction to an upswing and decline phase of the economic cycle.

Many of the traditional profitability indicators of financial performance such as **RONA, ROE, RNOA** and the value indicator **EVA** follow the trade cycle. These results are to be expected and consequently not many conclusions could be drawn from the findings. This may be attributed to the composition of the ratios, which are based on assets or components of assets and do not fluctuate significantly from year to year due to the historic cost basis for the valuation of the assets. LI enterprises have mostly higher ratio values than a CI enterprise due to the higher turnover ratios and lower income margins among LI enterprises and higher income margins and lower turnover ratios among the CI enterprises.

Earnings per share (EPS) indicate an apparent lead pattern among the CI enterprises. This may allude to the effect of anticipated improvement in earnings prior to the following upswing cycle in the economy. For instance, a reduction in interest rates and the anticipated changes in consumer expenditure may be possible reasons for the lead pattern. It is also possible that the apparent lead among the CI enterprises may be an indication of an upswing in the economic cycle. The LI enterprises indicate a lag pattern which may allude to the ability of LI enterprises to sustain and improve earnings during the initial stages of a decline phase in the economic cycle.

DPS indicates a lag pattern for both the CI and LI enterprises. It is possible that both the CI and LI enterprises adhere to their dividend policy in the short term after the commencement of the decline phase. It becomes apparent during the decline phase that a reduction in the ratio occurs among both CI and LI enterprises, possibly for different reasons. As indicated previously, it appears that LI enterprises use less debt financing during the decline phase. A

rights issue may cause a reduction in the DPS, where the proceeds are used to supplement capital requirements.

CI enterprises use more debt financing during the decline phase. In contrast to the LI enterprises it appears that adjustments may be made to the existing dividend policies of CI enterprises. It is also possible that a combination of debt and equity raising occurred, causing the DPS to decrease. Furthermore, the lag pattern exhibited by the CI enterprises suggests that the economy may lead a decrease or increase in DPS. In addition, it is also possible that the lag pattern may be attributed to an increase in earnings during the initial stages of the decline phase, while the reduction in project income becomes evident after the slowdown in the economy and once outstanding payments related to contractual obligations are received.

It appears that the **growth in earnings per share** and **attributable earnings** increase at a slower rate from the upswing to the decline phase. Growth in earnings per share improves at a slower rate for both the CI and LI enterprises, which may be caused by a slowing in the growth rate of earnings. This may be attributed to rate increases, which are continuously measured on higher base figures. Both these ratios exhibit lead patterns, which highlight their relevance for forecasting financial performance.

The **market value of equity to book value of equity** in total and per share exhibit lead patterns. These ratios are affected by the manner in which the market values the earnings of CI and LI enterprises. This consequently causes the market to adapt to expectations of economic upswing and decline. Furthermore, these findings are also relevant for market forecasting and also indicate that the market acts and reacts in a rational manner to changes in the economic cycle.

The **market value of ordinary shareholders' interest and interest-bearing debt to total capital** ratio is primarily affected by shareholder sentiment. It is clear that the market reacts to, and anticipates, cyclical changes in the economy. The market expectations regarding the share price of CI enterprises during the upswing period gradually decrease, causing the market value to decrease closer to the downswing.

The **interest-bearing debt to total shareholders' interest** ratio is used to highlight the gearing position of the enterprises and the use of debt to equity capital. The use of debt versus equity to finance operational activity appears to differ for CI and LI enterprises as a consequence of their gearing strategies. In addition, it would appear that the use of short- and long-term interest-bearing debt also differs between the two groups. LI enterprises exhibit more volatility in cash flow than the CI enterprises, which, given the nature of these enterprises (with a generally lower fixed cost base than CI enterprises), is possibly unexpected. The LI enterprises may not be particularly suitable for financial forecasting; however, the apparent lead pattern exhibited by the CI enterprises could provide an indication of the use of debt in anticipation of changes in the economic cycle.

LI enterprises use more debt during the upswing phase as indicated by the interest-bearing debt to total shareholders' interest ratio. It is therefore to be expected that even though cash flow is anticipated to improve during the upswing phase, the financing charges may increase at a faster rate. It is to be expected that coverage should improve in an economic upswing and decrease during the decline for both groups, although the magnitude of the fluctuations in coverage will differ between them due to the different use of debt financing.

The **cash flow to interest payments** coverage ratio indicates a lead pattern for both the CI and LI enterprises. This is appealing, as it may be possible to anticipate changes in the economic cycle on the basis provided by the lead pattern. The finding indicates that, irrespective of the CI or LI nature of the enterprise, the potential use and relevance of this ratio for forecasting movements in the economic cycle could be further researched.

The findings presented above have implications for both the CI and LI enterprises. Several of the findings have relevance for CI and LI enterprises during either or both the upswing and decline phase of the economic cycle. The relevance of the results for CI and LI enterprises should be considered in the context of the changes that occur in demand for products and services during upswing and decline phases of the economic cycle:

- More debt financing is used by CI enterprises during the decline phase to service fixed costs when demand for products and services decreases as a result of a slowdown in the economy.

- An increase in the cash flow interest coverage ratio among CI enterprises during the decline phase may indicate an imminent upswing in the economic cycle.
- EPS may allude to an anticipated upswing in the economic cycle among CI enterprises.
- An upswing in the economic cycle may be anticipated by an increase in the working capital to operating cash flow ratio of LI enterprises.
- More debt financing is used during the upswing period by LI enterprises, which may be attributed to greater demand and consequently results in a higher gearing position.
- An increase in the cash flow interest coverage ratio during the decline phase may indicate an imminent upswing in the economic cycle for LI enterprises.

9.3 Conclusions

The underlying hypotheses of this study as stated in Chapter 1 are as follows:

H_{01}: There are no differences in the behaviour of financial indicators between CI and LI enterprises during an upswing and decline phase of the economic cycle based on a single representative measure.

H_{02}: CI and LI enterprises exhibit similar behaviour patterns for ratios when the analysis is based on the individual years of the research period.

On the basis of these hypotheses, the following theoretical and practical conclusions are relevant to the study:

- The approach proposed in this study provides a different perspective on financial performance measurement by considering internal factors such as the CI and LI nature of an enterprise together with the external factors such as the upswing and decline phases of the economic cycle.

- A single upswing and decline phase is selected to represent an increase and decrease in the economic cycle. Although it may be argued that multiple upswing and decline phases should be used, a single upswing and decline phase was initially considered as an adequate reflection of economic activity, given the new perspective on financial performance

measurement provided by this study. Although the research period covers six years, three upswing and three decline years are distinguishable as part of the trend exhibited by the CI and LI enterprises over the upswing and decline phases of the economic cycle. The period for the research is selected for the following reasons. Prior to 1986 the selection of an upswing and decline phase would have been impractical, firstly due to the immediately preceding upswing and decline phases lasting only one and two years respectively and, secondly, the number of enterprises included in the research would be limited as it would not have been possible to calculate the cash flow ratios for these enterprise due to a lack of cash flow information in the BFA-NET database.

- An alternative approach to the measures used to determine the CI nature of an enterprise's activities is proposed in this study. It is apparent from the literature that researchers do not adopt a uniform approach to distinguish between the CI and LI nature of an enterprise. The approach adopted in this study considers separate measures, i.e. NFA:TA and NFA:EMP to represent the CI and LI nature of an enterprise's activities. These individual measures are then considered in combination and presented as a single measure for capital intensity versus labour intensity.

- About half (46%) of the financial performance indicators, which include RONA, ROE, RNOA and EVA, follow the trade cycle. The normal expected group is dominated by the profitability and inflation-adjusted ratios. All the latter ratios exhibit normal expected patterns. These results are to be expected and consequently the ratios indicate relative stability over the duration of the upswing and decline phases. The findings may be attributed to the composition of the ratios, which are based on assets or components of assets which do not fluctuate significantly from year to year due to the historic cost basis for the valuation of the assets. LI enterprises have mostly higher ratio values than a CI enterprise due to the higher turnover ratios and lower income margins among LI enterprises and higher income margins and lower turnover ratios among the CI enterprises.

- Traditional profitability ratios such as RONA, RNOA, ROE and the value-creation ratio EVA form part of the normal expected group of patterns. Within the profitability group, 80% of the ratios exhibit normal expected patterns. These ratios indicate relative stability

over the economic cycle and may be appropriate for the purposes of medium- and long-term financial forecasting as they follow the trade cycle.

- The results of the analysis based on a single representative measures indicates that certain ratios could not be used with confidence universally across all types of enterprises when determining financial performance. Ratios such as RONA indicate differences between CI and LI enterprises during the decline phase, but not during the upswing phase, while ROS indicates that the CI and LI enterprises differ during the upswing phase, but not during the decline phase. The cash flow to turnover ratio (CATA:TURN), for instance, indicates differences between the CI and LI enterprises over both the upswing and decline phases.

- Approximately 39% of the ratios indicate different behaviour patterns (mixed patterns) for the CI and LI enterprises based on the individual years of the analysis. For instance, EPS indicates a possible lead pattern for the CI enterprises. The majority of the cash flow ratios also indicate different patterns for the CI and LI enterprises over the duration of the economic cycle.

- Mixed ratio patterns exhibited by the CI and LI enterprises that indicate increasing normal expected patterns and decreasing lead patterns could also be used for forecasting, given their relative stability over the upswing and decline phases, but with less confidence, however.

- The interest-bearing debt to total shareholders' interest (IBD:TSI) ratio provides an indication of the solvency position of the CI and LI enterprises. This ratio forms part of the mixed pattern group and indicates noteworthy findings regarding the use of debt financing by CI and LI enterprises. More debt financing is used by CI enterprises during the decline phase, while more debt financing is used during the upswing period by LI enterprises.

- The cash flow to interest payments (CTA:INT) coverage ratio indicates a lead pattern for both the CI and LI enterprises. This is appealing as it may allude to an anticipated change in the economic cycle given the lead pattern exhibited by the CI and LI enterprises. The finding indicates that, irrespective of the CI or LI nature of the enterprise, the potential use

and relevance of this ratio for forecasting movements in the economic cycle could be further researched.

- Market-related ratios such as market value of equity to book value of equity (MVE:BVE) and market value of equity and interest-bearing debt to total capital (MVA) are affected by shareholder sentiment. The MVE:BVE ratio in total and per share and MVA ratio exhibit lead patterns, which may indicate that the market reacts to, and anticipates, cyclical changes in the economy. These ratios are affected by the manner in which the market values the earnings of CI and LI enterprises, which consequently causes the market to adapt to expectations of economic upswing and decline. These findings are also relevant for market forecasting and also indicate that the market acts and reacts in a rational manner to changes in the economic cycle.

- On the basis of the research conducted in Chapters 7 and 8 it may be possible to highlight several observations from a comparison of the patterns exhibited by the ratios based on a single representative measure and the individual years of the analysis. The declining and declining intersecting patterns in Chapter 7 may correspond to the normal expected or decreasing lead patterns obtained in Chapter 8. However, it is not possible to indicate what ratios that exhibit declining and declining intersecting patterns indicate normal expected patterns and which ratios indicate decreasing lead patterns. Furthermore, the ratios that indicate an upward pattern in Chapter 7 may allude to increasing lag or lead patterns in Chapter 8. However, it is not possible to determine whether or not both the CI and LI enterprises indicate increasing lead or lag patterns from the analysis in Chapter 7. The torch, funnel and scissors patterns exhibited by ratios in Chapter 7 could indicate a mixed pattern for the corresponding ratios in Chapter 8.

  Most of the traditional profitability ratios such as RONA, ROE, ROSE and RNOA that indicate declining or declining intersecting patterns in Chapter 7 also indicate normal expected patterns in Chapter 8. Only two growth ratios (internal and sustainable growth rates) indicate corresponding declining and normal expected patterns in Chapter 7 and 8 respectively, while a further two ratios (growth in earnings per share and attributable earnings) indicate declining intersecting patterns in Chapter 7 and decreasing lead patterns in Chapter 8. As indicated above, it would not be possible to distinguish

between ratios that exhibit declining and declining intersecting patterns in Chapter 7 and those that indicate normal expected or decreasing lead patterns in Chapter 8, which is the case among the traditional growth ratios.

A comparison of the patterns exhibited by the cash flow ratios in Chapters 7 and 8 indicates that most of the ratios which exhibit torch, funnel and scissors patterns also indicate mixed patterns in these chapters respectively. All the value ratios indicate patterns in Chapter 7 that correspond with the relevant patterns in Chapter 8 as highlighted above. However, the problem of distinguishing between normal expected and decreasing lead patterns for the declining and declining intersecting patterns in Chapter 7 is also prevalent among the value ratios. The majority of the inflation-adjusted ratios that indicate declining patterns in Chapter 7 also indicate normal expected patterns in Chapter 8. The comparison of Chapters 7 and 8 above therefore indicates the necessity to attach more value to the analysis and findings presented in Chapter 8.

9.4 Recommendations and research challenges

In the context of the aspects mentioned above and the analysis conducted in this study, the following recommendations are highlighted:

- In order to provide a firmer basis for the interpretation of the ratio patterns exhibited by the CI and LI enterprises, multiple periods of economic upswing and decline should be considered in future research. The use of multiple phases of economic upswing and decline would ascertain whether or not the ratios exhibit similar patterns to those obtained when a single upswing and decline phase is considered. Furthermore, the stability of the ratios to provide similar patterns when multiple periods of economic upswing and decline as opposed to a single upswing and decline phases could also be ascertained.

- A longer period of economic activity could be considered by using, for instance, the changes in the GDP as an explanatory variable. This would, however, imply the loss of the distinction between upswing and decline phases of the economic cycle, but would substantially increase the available data. It might be possible to estimate the exposure of the CI and LI nature of the enterprise to smaller changes in the GDP by determining the

correlation between the nature of the enterprise and changes in the economic cycle. In this manner it is possible to use annual values of the CI and LI nature of the enterprise. This approach will also enable the use of econometric panel studies.

- The limitation in the research of a changeover in the economic cycle from an upswing to a decline phase or vice versa during the financial year of an enterprise could possibly be addressed by "reconciling" the financial year-end of the enterprise and the changeover month of the economic cycle. One possibility may be to "annualise" the financial statements of the enterprise to correspond with the changeover month of the economic cycle. This effectively implies either extending or reducing the financial year-end of the enterprise.

- More research into the lags and leads exhibited by the CI and LI enterprises for specific ratios should be conducted. For instance, further research could indicate whether or not similar lead and lag patterns are obtained when single and multiple phases of economic upswing and decline are used. More emphasis should also be placed on qualitative aspects such as management philosophy and a CI or LI enterprise's operating and financial policy as a means to further describe and understand the patterns exhibited by the indicators. The quantitative analysis should be complemented by an analysis of the above-mentioned qualitative factors.

- The indicators that exhibit lead patterns (if they are confirmed to be "lead patterns") could be used together with forecasts of other key economic indicators to anticipate an economic upswing or decline phase in the economic cycle. A model could be constructed to determine the sensitivity of the ratios and key economic indicators to changes in the economic cycle.

- A diverse number of financial measures in the literature are highlighted to represent the CI or LI nature of an industrial enterprise. More research into the theoretical understanding of the nature and scope of capital intensity should be undertaken in order to obtain uniform measures which are representative of the CI or LI nature of an enterprise. The possibility of adopting a different approach to distinguish between CI and LI enterprises could also be considered in further studies. For instance, principal component analysis and related bi-

plots can be used. The principal component scores obtained from the analysis indicate linear combinations of the measures of capital intensity used as a composite measure of the degree of capital intensity. Additional research could also include whether or not a single measure for CI would offer the same results as the combined measure proposed in this study or the principal component score alluded to above as a means to distinguish the CI and LI nature of industrial enterprises. Furthermore, limited reference is made to labour intensity as a measure to describe the nature and scope of an enterprise's production in the financial literature. A more comprehensive methodology needs to be established in order to identify and consider the use of a measure for labour intensity in financial management research.

- A possible limitation of the approach proposed in this study to distinguish between CI and LI enterprises is the difficulty of analysing the enterprises that cluster around the middle of the capital intensive versus labour intensive scale. In addition, it is possible that an enterprise such as an airline may be both CI and LI. Future research could consider using the scores on the capital intensive versus labour intensive scale as explanatory variables for the ratios, or alternately as explanatory variables for the variables that define the ratios.

- Fewer financial performance ratios should be considered in a future study in order to ensure a more focused approach to addressing and analysing the CI and LI nature of an enterprise and multiple periods of upswing and decline in the economic cycle.

- An analysis of the financial theory indicates a need to focus on additional dimensions of financial performance measurement. More emphasis in research should be placed on a combination of the internal and external dimensions of financial performance measurement, i.e. a combination of the nature and scope of an enterprise's activities and its external environment. Contemporary issues such as employment creation and industrial and technological innovation as well as industry and globalisation effects that affect enterprises and are prevalent in the current South African economic environment could also be considered. These factors could be considered individually or in combination.

- The study could be duplicated in different circumstances. For instance, it may be useful to determine whether or not the same ratios calculated for a group of US industrial

enterprises would also indicate different lead and lag patterns for the CI or LI enterprises during an upswing and decline phase of the United States economy.

- Longitudinal studies should be considered as a long-term project to determine how the nature of CI and LI enterprises changes over time given the dynamic changes that occur in the business environment.

- The behaviour of changes in a selected number of ratios should be monitored over several years to determine how changes in the economic cycle over time affect the stability of a specific group of ratios identified in this study.

In the final assessment, the research suggests that CI and LI enterprises differ in terms of the behaviour exhibited by certain financial performance indicators during an upswing and decline phase of the economic cycle. Furthermore, it appears that it is possible to use a large number of traditional profitability indicators to forecast medium- and long-term financial performance as they follow the trade cycle. Several indicators that are directly or indirectly affected by the stock market also suggest the possibility of leading the economic cycle and therefore could provide an indication of possible future economic upswing and decline phases for both CI and LI enterprises. The behaviour of other ratios suggests that CI and LI enterprises differ in respect of whether they may lead or lag the economic cycle. It is therefore not possible to consider the universal use of financial indicators for performance analysis by all enterprises, but such analysis is dependent on the nature and scope of the enterprise and the phase of the economic cycle.

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